Notices on the User Manual

✪ Basic Definition

Unless otherwise stated in advance, term definitions of the manual are shown as follows:

- Servo motor or motor: SD/SW series motors and other derivative brand motors.
- Servo Driver: W or V series servo Driver.
- Servo system: matching servo motor and servo Driver.

✪ Manual Structure

Please read relevant chapters according to your needs

No.	Chapter	Model and Peripheral Equipment Selection	Rating and Wiring	System Design	Installation and Wiring	Commissioning and Adjustment	Inspection and Maintenance
Chapter 1	Overview	▲					
Chapter 2	Model Selection	▲					
Chapter 3	Motor Specification and Dimension	▲	▲	▲	▲		
Chapter 4	Driver Specification and Dimension	▲	▲	▲	▲		
Chapter 5	Wiring			▲	▲	▲	
Chapter 6	Digital Operator			▲		▲	
Chapter 7	Parameters and Settings					▲	▲
Chapter 8	Operation						▲
Chapter 9	Maintenance and Inspection						▲

✪ Writing of Negative Logic Signal

In the manual, negative logic signal (effective for low level) is expressed by adding "-" after signal. For example,

- $\overline{A}$ is written as A-

✪ Logical Interpretation of Input/Output Port

- Low level——switch on positive edge——switch on to off
- High level——switch off negative edge——switch off to on

Safety Precautions

Safety Signs

As for safety, the following signs are used in the manual. Please follow what indicated by safety signs.

Note! The sign indicates to follow article use requirements or rules!

Caution The sign indicates it may cause injury or article damage!

Warning The sign indicates it may cause imminent danger including damage or serious injury.

Safety Precautions

The section explains some important items that user shall comply with including acceptance, storage and transport, installation, wiring, commissioning, use and maintenance.

To avoid any accident, please be sure to observe the following rules.

✪ Notes on Acceptance

Note

- ✧ Product damaged or in fault shall not be used, or else it may cause fire or fault.
- ✧ Servo driver shall be used with performance-matched servo motor.
- ✧ If any question after acceptance inspection, please contact with your supplier or EVTA company.

✪ Notes on Storage and Transport

Caution

- ✧ Do store and transport the product according to storage and transport environment conditions.
- ✧ Don not pile the product too high to avoid falling off.
- ✧ Product shall be packed properly in transport.
- ✧ Please don not load too many products together.
- ✧ When transporting servo motor, please do not drag cable, motor shaft and encoder.
- ✧ Servo driver and servo motor shall be kept away from external force and impact.

✪ Notes on Installation

Caution

Servo Driver and servo motor:

- ✧ Never install the product on the inflammables or nearby, or else may cause fire.
- ✧ Keep product from shake. Shock is strictly prohibited.
- ✧ In case of parts damaged or incomplete, please do not carry out installation.

Servo driver:

- ✧ Product shall be installed in control cabinet with sufficient protection grade.
- ✧ Please ensure to reserve specified gap distance between servo driver and internal wall of electrical cabinet as well as other equipments, or else it may cause fault and even fire disaster.
- ✧ Please do observe the requirements on installation direction.
- ✧ Please do not block air inlet and outlet. Also do not let foreign matters enter the product.
- ✧ Good radiating conditions must be provided.
- ✧ Be aware of dust, corrosive gas, conductive object, liquid and inflammables/explosives into servo driver.

Servo motor:

- ✧ Product shall be mounted firmly to prevent going loose under shake.
- ✧ Prevent liquid from penetrating to damage computer and encoder.
- ✧ Do not knock at motor and motor shaft to avoid encoder damage.
- ✧ Motor shaft cannot bear load exceeding threshold.

✪ Notes on Wiring

Caution

- ✧ Personnel for grounding and inspection shall be of full capability in relevant work.
- ✧ Grounding and inspection shall be carried out 5 minutes after power cutoff to avoid electric shock.
- ✧ Please implement wiring correctly and reliably, or else it may cause motor out of control, injury or fault.
- ✧ Please firmly connect power terminal and motor connector, or else it may cause fire.
- ✧ Servo driver and servo motor shall be well grounded.
- ✧ Incorrect voltage or polarity of power may cause explosion or operation accident.
- ✧ Servo driver and servo motor shall be well mounted before grounding.
- ✧ Be sure to insulate wires and keep wire from extruding to avoid electric shock.

Note

- ✧ Grounding shall be done correctly and firmly, or else it may cause motor running wrongly or damage equipments due to poor contact.
- ✧ U, V and W terminals of servo motor shall not be reversely connected or connected with AC power.
- ✧ Servo motor shall be directed connected with servo drivers, and no capacitor, inductor or filter is allowed to connect between them.
- ✧ Prevent conductive fastener or wire end entering servo driver.
- ✧ Wire and non-heatproofing object shall not be close to radiator of servo driver and servo motor.
- ✧ Flywheel diode connected in parallel on output signal DC relay shall not be connected reversely.

✪ Notes on Commisioning and Operation

Warning

- ✧ Rated torque of servo motor shall be higher than effective continuous load torque.
- ✧ Ratio of load inertia and servo motor inertia shall be less than recommended value.
- ✧ Servo driver shall be equipped with matching servo motor.
- ✧ Please use designated supply voltage.
- ✧ Please confirm servo driver and servo motor have been mounted well and fastened firmly before power on, and power voltage and wiring shall be correct.
- ✧ During commissioning, please idle servo motor (not connected with drive shaft) to avoid accident.
- ✧ Commissioning
- ✧ To prevent mechanical and equipment damage caused by wrong operation, please confirm parameters set correctly before load commissioning.
- ✧ Please pre-set user parameters corresponding to the machine before installing on it. If no parameter set before operation, it may cause machine out of control or fault.
- ✧ To operate servo motor on vertical shaft, please set safety unit to prevent workpiece falling in the state of alarm and excess of stroke. In addition, please make stop setting to servo lock in case of excess of stroke.
- ✧ Please do set correct torque ratio, or else it may cause vibration.
- ✧ When power on or power just cut off, radiator of servo driver, regeneration resistor and motor may be under high temperature. Please don't touch.
- ✧ To ensure the stability of servo system, please do not set extreme user parameters.
- ✧ In case of alarm, please reset alarm after troubleshooting and ensure it is safe, and then power on to operate.

✪ Notes on Use

Caution

- ✧ When using servo system, a emergency stop circuit shall be connected to ensure that equipment can stop running and power can be cut off immediately in case of accident.
- ✧ Before resetting an alarm, please do confirm operation signal is cut off, or else it may start suddenly.
- ✧ Servo driver shall be used with supporting servo motor.
- ✧ When servo driver is running, its grounding terminal shall be grounded reliably.
- ✧ Please set stop device on the side of machine to ensure safety.
- ✧ Don't connect or disconnect system power frequently to avoid system damage.
- ✧ Servo driver and servo motor may heat after continuous running, so please don't touch driver radiator and motor when they are running or within 5 minutes when power cut off.
- ✧ When servo motor is connected with the machine, if wrong operation, it will not only cause machine damage, but also may cause personal accident.。
- ✧ Except special application, it is not necessary to change the maximum rpm (PA23), or else it may be much dangerous.
- ✧ To change servo driver, please transmit original user parameters of servo driver to new servo driver and then re-start it, or else it may cause machine damage.
- ✧ Please never try to remodel the product.
- ✧ Do not refit servo system without permission.

✪ Notes on Maintenance

Warning

- ✧ After servo motor is powered off, high voltage will still be kept for a period of time. Therefore, please don't dismount cable within 5 minutes after power off and don't touch terminal block.
- ✧ Dismounting and maintenance personnel shall be with necessary professional knowledge and work capability.

Notes

- ✧ To change servo driver, please transmit original user parameters of servo driver to new servo driver and then re-start it, or else it may cause machine damage.
- ✧ Please don't change wiring when power on, or else it may cause shock or injury.

Caution

- ✧ In case of alarm, do trouble shoot and reset alarm signal before restarting.
- ✧ When power on again after power interruption, please keep away from the machine, because the machine may start suddenly (machine design shall ensure no danger will occur when restarting.)

✪ Other Notes

Notes

- ✧ The product is not designed and manufactured to be used in machine and system with danger to person.
- ✧ When user selects the product for its machine and system, user shall take safety protection measures into consideration in design and manufacture to avoid improper operation or accident caused by product abnormality.
- ✧ Illustrations in the manual are representative examples and may be different from product you received.
- ✧ For product improvement, specification change or to improve the use convenience of the manual, we may change the manual at proper time. For any change, the document number of the manual will be updated and it will be issued as revised version.
- ✧ Please contact with our company if you need new manual for damaged or lost one.
- ✧ As for product changed by customer, the company will provide no guarantee against quality, and will bear no responsibility for injury and loss caused by product change.
- ✧ As for product waste, please dispose as common industrial waste.

Chapter 1 General 1

Chapter 2 Model Selection 2

Chapter 3 Motor Specification and Dimension 3

Chapter 4 Driver Specification and Dimension 4

Chapter 5 Wiring 5

Chapter 6 Digital Operator (W Series) 6

Chapter 7 Parameters and Setting 7

Chapter 8 Operation 8

Chapter 9 Maintenance and Inspection 9

10

Contents

Chapter 1 General 1

1.1 Product Confirmation 1

1.1.1 Product Confirmation Items 1

1.2 Product Nameplate 1

1.3 Product Appearance 2

1.3.1 Servo Driver Appearance 2

1.3.2 Servo Motor Appearance 2

1.4 Peripheral Connection of Driver 3

1.4.1 W Series 3

1.4.2 F Series 4

1.4.3 P Series 5

Chapter 2 Model Selection 6

2.1 Model of Servo Driver 6

2.2 Model of Servo Motor 6

2.3 Table of Driver Code and Motor Model 7

Chapter 3 Motor Specification and Dimension 9

3.1 Safety Notices 9

3.2 Parameters of Servo Motor 9

3.2.1 60 Series Servo Motor 9

3.2.2 80 Series Servo Motor 11

3.2.3 90 Series Servo Motor 12

3.2.4 110 Series Servo Motor 13

3.2.5 130 Series Servo Motor 15

3.2.6 180 Series Servo Motor 17

Chapter 4 Driver Specification and Dimension 20

4.1 Driver Specification 20

4.1.1 W Series 20

4.1.2 F Series 20

4.1.3 P Series 21

4.2 Installation Environment for Servo Driver 21

4.2.1 Protection 21

4.2.2 Temperature and Humidity 21
4.2.3 Vibration and Shock 21
4.2.4 Firefighting 21
4.3 Driver Installation 22
4.3.1 Installation Dimension of Driver 22
4.3.2 Installation Interval of Driver 22
4.4 Dimension Drawing of Servo Driver 23
4.4.1 W Series 23
4.4.2 F Series 24
4.4.3 P Series 24
Chapter 5 Wiring 25
5.1 Control Wiring Diagram 25
5.1.1 W Series Control Wiring Diagram 25
5.1.2 F Series Control Wiring Diagram 27
5.1.3 P Series Control Wiring Diagram 29
5.2 Power Terminal 31
5.2.1 Power Terminal Connection 31
5.2.2 (Power Input/Output) Interface Definition of TB Power Terminal 32
5.2.3 Connection Standards of Braking Terminal 32
5.3.2 Switch Output Interface Type 2 33
5.3.3 Pulse Input Interface Type 3 33
5.3.4 Analog Input Interface Type 4 34
5.3.5 Encoder Signal Differential Output Interface Type 5 34
5.3.6 Type 6 Encoder Z Signal Open-collector Output Interface 34
5.3.7 Servo Motor's Photoelectric Encoder Interface Type 7 35
5.4 CN1/CN2/ CN3 Signal Terminal Connection Standards and Interface Definition . 35
5.4.1 W Series 35
5.4.2 F Series 38
5.4.3 P Series 41
5.5 Pulse Input Form 42
5.6 Pulse Input Sequence 42
5.6.1 Time Parameter 42
5.6.2 Sequence Charts of Three Pulse Input Forms 43

5.6.3 Motor Encoder Output Feedback 44
Chapter 6 Digital Operator (W Series) 45
6.1 Operation and Display Interface 45
6.2 Key name and Function 45
6.3 Operation Mode of Main Menu 46
6.4 Monitoring Status 46
6.4.1 Framework Corresponding to Monitoring Status Frame 46
4.2 Monitoring Status Description 47
Chapter 7 Parameters and Setting 49
7.1 List of Parameter Code 49
7.2 List of Parameter Function 51
7.3 Parameter Setting Adjustment 56
7.3.1 Position of Parameter Operation Interface on the Main Menu 56
7.3.2 Restore Default Setting of Driver 56
7.3.3 Invoke Motor Code 58
7.3.4 Change Parameter and Store Parameter Setting 58
7.4 Parameter Management 59
Chapter 8 Operation 60
8.1 Notes on Operation 60
8.2 Grounding 60
8.3 Operation Sequence 60
8.3.1 Power-on Sequence 60
8.3.2 Alarm Sequence 61
8.3.3 Brake Sequence 61
8.4 Commissioning 61
8.5 Control Mode 61
8.5.1 Position Control Mode 62
8.5.2 Internal Speed Control Mode 63
8.5.3 Operating Speed Mode of External Analog Input 64
8.5.4 Manual Commissioning Control Mode 65
8.5.5 Zero Test Mode of Motor 66
8.5.6 Load Inertia Test mode of Motor 66
8.5.7 Position and Speed Switching Mode 67

8.6 Application of Brake Release Signal 68
8.7 Rotating Direction Switch of Motor 70
8.8 Basic Performance Parameter Adjustment 71
8.9 Self-testing Gain Parameter Adjustment 72
8.9.1 Motor Model Confirmation 72
8.9.2 Measure of Load Inertia 72
8.9.3 Basic Parameter Block Diagram 72
8.9.4 Rigidness Setting of EVTA Servo Corresponding Machine 72
8.10 Computed Value 73
Chapter 9 Maintenance and Inspection 74
9.1 Maintenance Notice 74
9.2 General List of Alarm Codes 74
9.3 Alarm Processing Methods 74
Warranty Agreement 78

Chapter 1 General

1.1 Product Confirmation

1.1.1 Product Confirmation Items

On arrival of the product, please confirm the following items:

- ✧ Check packing case in good condition and goods is not damaged in transport.
- ✧ Check nameplates of servo driver and servo motor and confirm goods received is what you ordered.
- ✧ Check packing list to confirm accessories are complete.

1.2 Product Nameplate

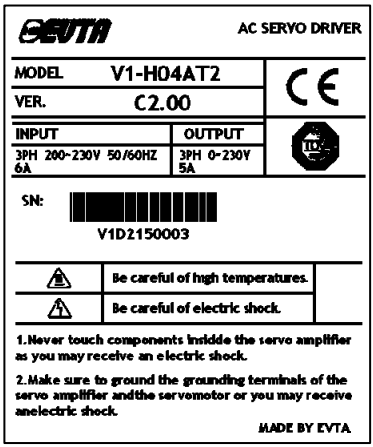

EVTA
AC SERVO DRIVER
MODEL V1-H04AT2
VER. C2.00
INPUT
OUTPUT
3PH 200-230V 50/60HZ 6A
3PH 0-230V 5A
SN:
V1D2150003
Be careful of high temperatures.
Be careful of electric shock.
1.Never touch components inside the servo amplifier as you may receive an electric shock.
2.Make sure to ground the grounding terminals of the servo amplifier andthe servomotor or you may receive anelectric shock.
MADE BY EVTA

Figure 1-1 Driver Nameplate

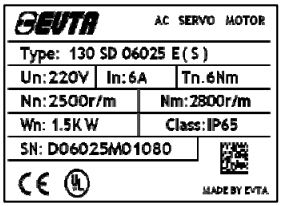


Figure 1-2 Motor Nameplate

1.3 Product Appearance

1.3.1 Servo Driver Appearance

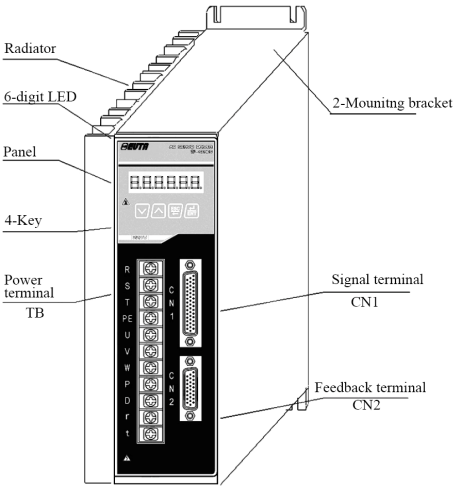


Figure 1-3 External View of Servo Driver

1.3.2 Servo Motor Appearance

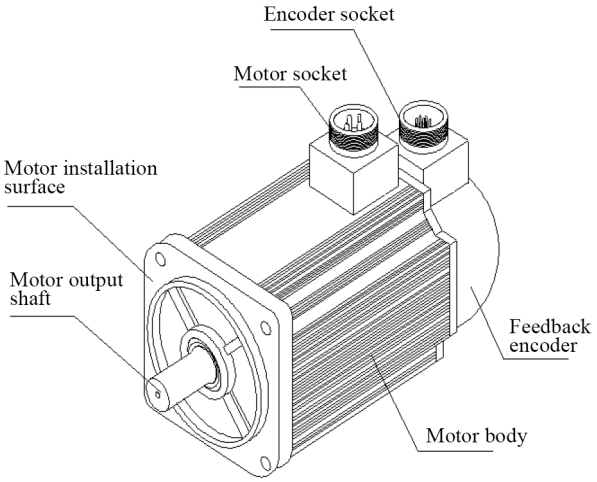


Figure 1-4 External View of Servo Motor

1.4 Peripheral Connection of Driver

To use servo driver unit, some peripheral equipments shall be equipped. Proper peripheral equipment can ensure stable operation of driver unit while improper equipment may decrease its life time and even damage driver unit.

1.4.1 W Series

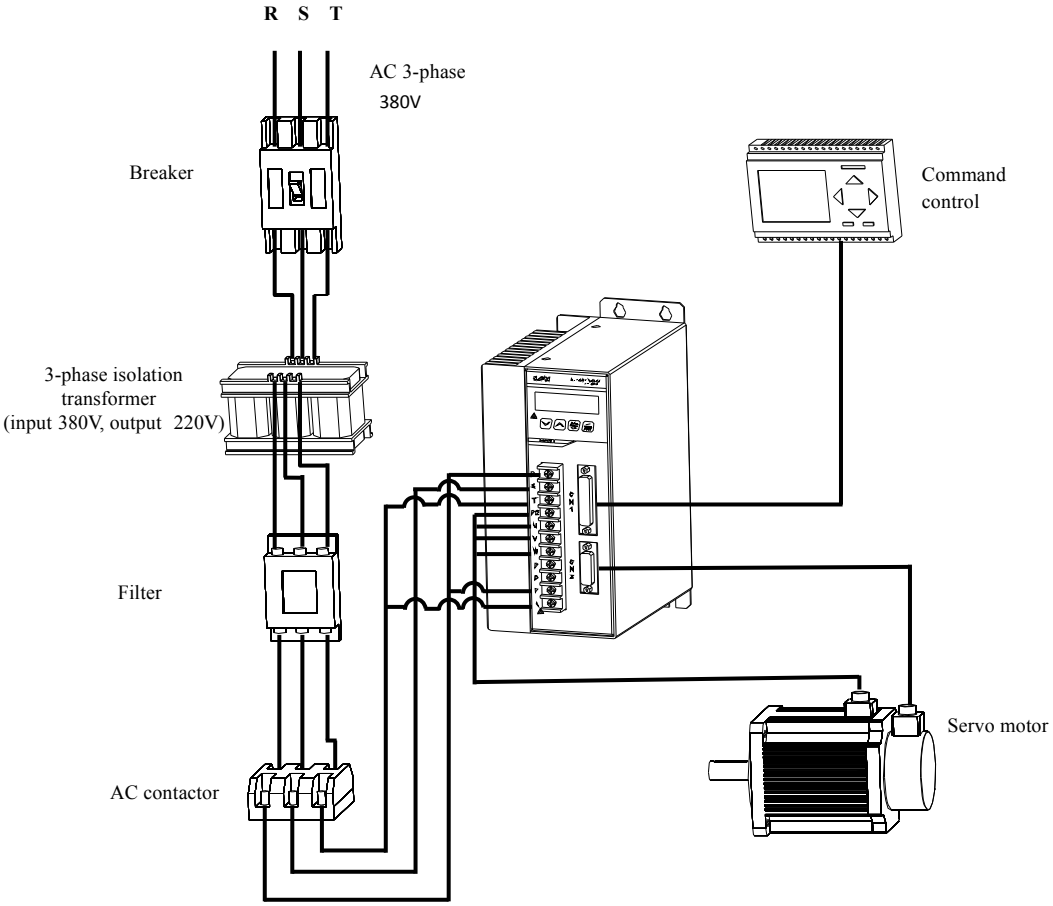


Figure 1-5 Peripheral Connection Diagram of W Series

1.4.2 F Series

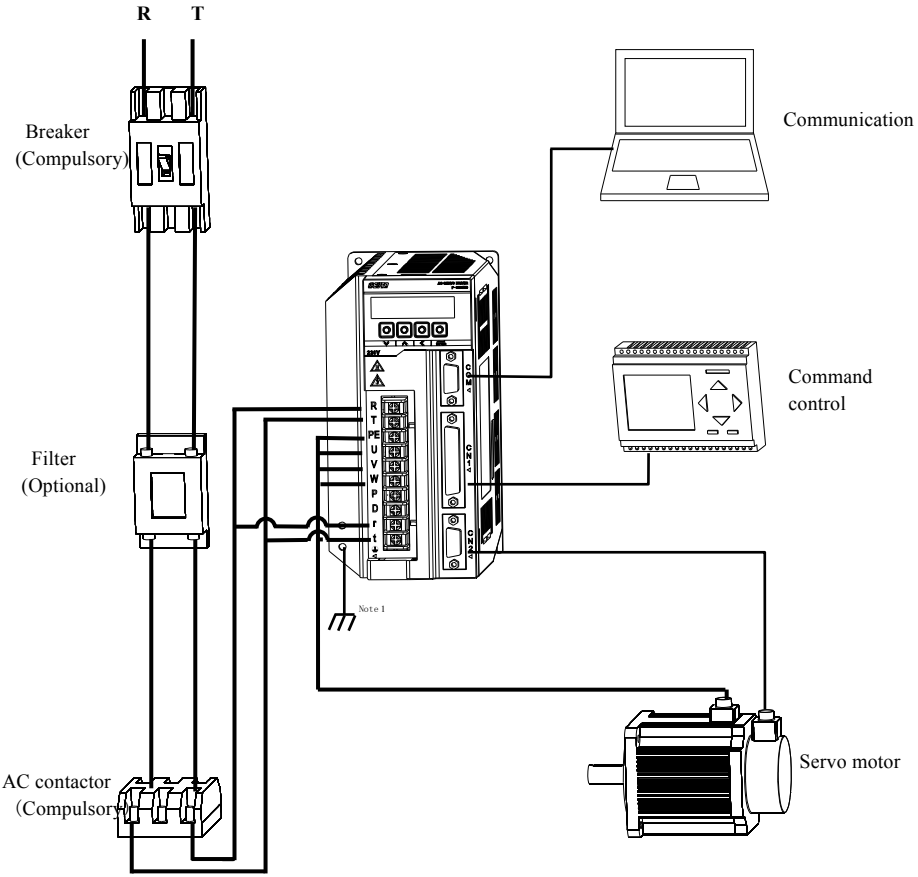


Figure 1-6 Peripheral Connection Diagram of F Series

Note 1: Wiring terminal PE or radiator can be selected to connect to ground reliably.

1.4.3 P Series

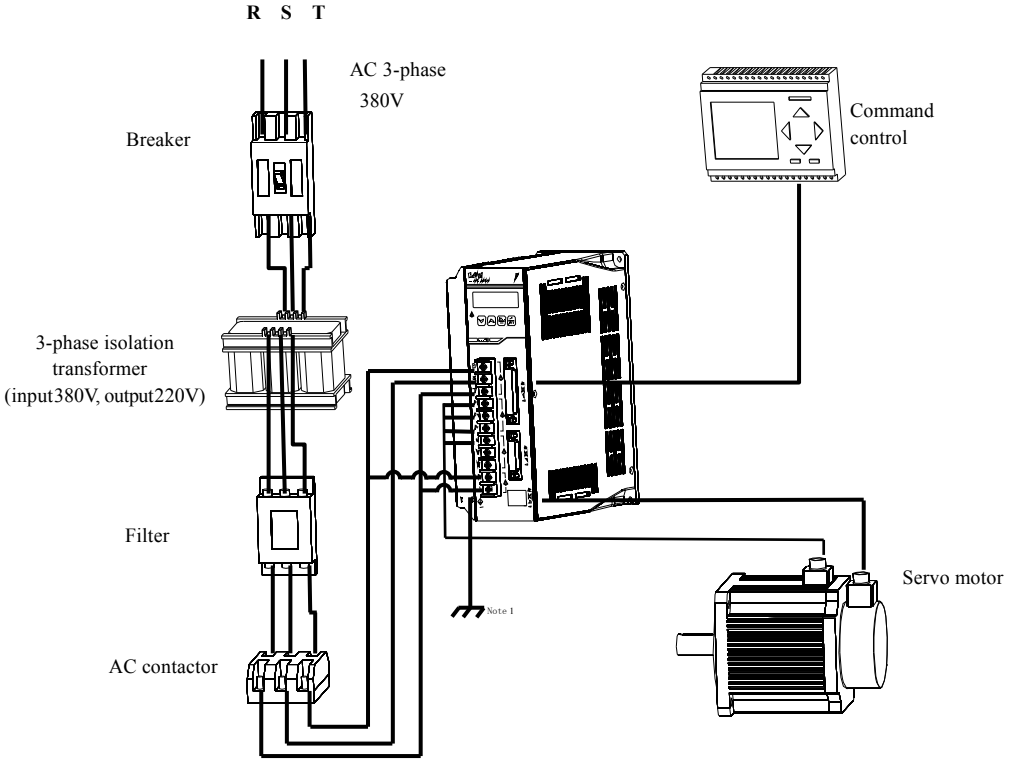


Figure 1-7 Peripheral Connection Diagram of P Series

Note 1: Wiring terminal PE or radiator can be selected to connect to ground reliably.

Chapter 2 Model Selection

2.1 Model of Servo Driver

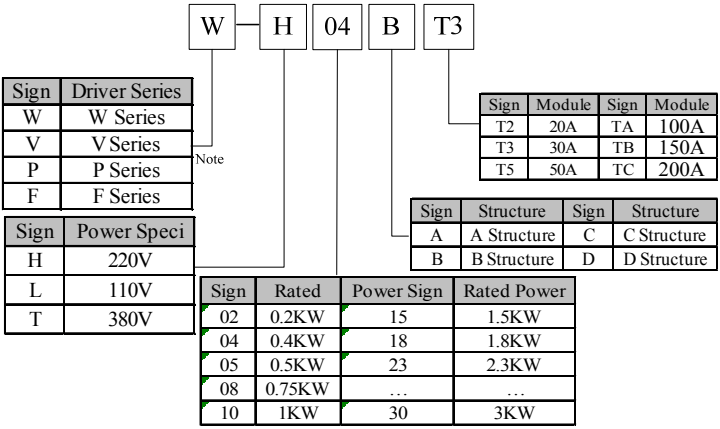


Figure 2-1 Driver Model

Note: W Series configuration is standard photoelectric incremental encoder.
P Series configuration is 17Bit incremental encoder.

2.2 Model of Servo Motor

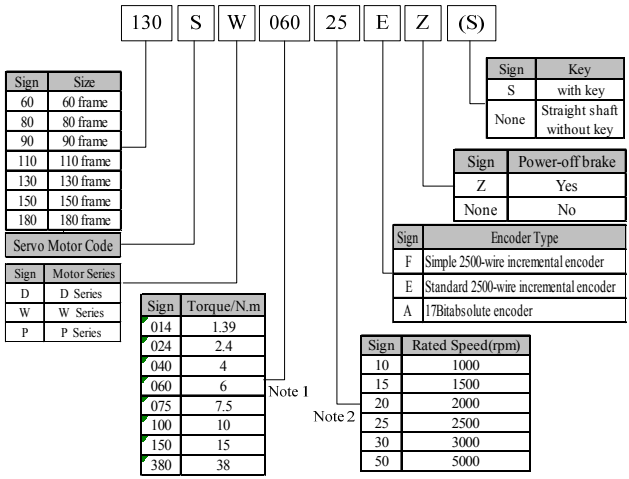


Figure 2-2 Motor Model

Note 1: mean zero-speed torque. Computing method: rated torque= code×0.1. Unit: N .m

Note 2: mean the rated rotation speed. Computing method: rated rotation speed=code×100. Unit: rpm.

2.3 Table of Driver Code and Motor Model

Main power modules of EVTA servo driver have different rated currents (20A, 30A and 50A) of the same appearance but in completely different control modes. Therefore, if one model of motor matches with servo drivers of different main power modules, the corresponding driver model codes are different.

Driver model code	Adaptive motor model	Rated power	0-speed torque	Rated rpm	Rated voltage	Rated current	Rated current of main power module
		(Kw)	(Nm)	(Rpm)	(V)	(A)	(A)
17	80SW01330F(S)	0.4	1.3	3000	220	2.6	20A/30A
18	80SW02430F(S)	0.75	2.4	3000	220	4.2	20A/30A
19	80SW03330F(S)	1.0	3.3	3000	220	4.2	20A/30A
31	60SD01330E(S)	0.4	1.27	3000	220	2.5	20A/30A
32	80SD03520E(S)	0.75	3.5	2000	220	3.5	20A/30A
32	90SD02430E(S)	0.75	2.4	3000	220	3.4	20A/30A
33	80SD02430E(S)	0.75	2.4	3000	220	3.2	20A/30A
33	90SD04025E(S)	1.0	4.0	2500	220	4	20A/30A
34	110SD02030E(S)	0.6	2	3000	220	4	20A/30A
35	110SD04030E(S)	1.2	4	3000	220	5	20A/30A
36	110SD05030E(S)	1.5	5	3000	220	6	30A
37	110SD06020E(S)	1.2	6	2000	220	6	30A
38	110SD06030E(S)	1.8	6	3000	220	8	30A
44	130SD04025E(S)	1.0	4	2500	220	4	20A/30A
45	130SD05025E(S)	1.3	5	2500	220	5	20A/30A
46	130SD06025E(S)	1.5	6	2500	220	6	30A
47	130SD07525E(S)	2.0	7.5	2500	220	7.5	30A
49	130SD10015E(S)	1.5	10	1500	220	6	30A
50	130SD10025E(S)	2.5	10	2500	220	10	30A
51	130SD15015E(S)	2.3	15	1500	220	9.5	30A
34	110SW02030E(S)	0.6	2	3000	220	4	20A/30A
35	110SW04030E(S)	1.2	4	3000	220	5	20A/30A
36	110SW05030E(S)	1.5	5	3000	220	6	30A
37	110SW06020E(S)	1.2	6	2000	220	6	30A
38	110SW06030E(S)	1.8	6	3000	220	8	30A
44	130SW04025E(S)	1.0	4	2500	220	4	20A/30A
45	130SW05025E(S)	1.3	5	2500	220	5	20A/30A
46	130SW06025E(S)	1.5	6	2500	220	6	30A
47	130SW07520E(S)	1.5	7.5	2000	220	6	30A
48	130SW07525E(S)	2.0	7.5	2500	220	7.5	30A
49	130SW10015E(S)	1.5	10	1500	220	6	30A

Driver model code	Adaptive motor model	Rated power	0-speed torque	Rated rpm	Rated voltage	Rated current	Rated current of main power module
		(Kw)	(Nm)	(Rpm)	(V)	(A)	(A)
50	130SW10025E(S)	2.5	10	2500	220	10	30A
51	130SW15015E(S)	2.3	15	1500	220	9.5	30A
110	130SD10025E(S)	2.5	10	2500	220	10	50A
111	130SD15015E(S)	2.3	15	1500	220	9.5	50A
112	130SD15025E(S)	3.8	15	2500	220	13.5	50A
119	180SD19015E(S)	2.9	19	1500	220	12	50A
151	130SD15015E(S)	2.3	15	1500	220	9.5	50A
The following motor model codes are applicable to match with most domestic servo motors of the same torque and rpm (e.g., equivalent motors from Welltec, GSK, MIGE, GETE, and Yuhai)							
17	80 Series 01330 (wiring-saving encoder)	0.4	1.3	3000	220	2.6	20A/30A
18	80 Series 02430 (wiring-saving encoder)	0.75	2.4	3000	220	4.2	20A/30A
19	80 Series 03330 (wiring-saving encoder)	1.0	3.3	3000	220	4.2	20A/30A
31	60 Series 01330 (2500-wire encoder）	0.4	1.27	3000	220	2.5	20A/30A
33	80 Series 02430（2500-wire encoder）	0.75	2.4	3000	220	4.2	20A/30A
34	110 Series 02030（2500-wire encoder）	0.6	2	3000	220	4	20A/30A
35	110 Series 04030（2500-wire encoder）	1.2	4	3000	220	5	20A/30A
36	110 Series 05030（2500-wire encoder）	1.5	5	3000	220	6	30A
37	110 Series 06020（2500-wire encoder）	1.2	6	2000	220	6	30A
38	110 Series 06030（2500-wire encoder）	1.8	6	3000	220	8	30A
44	130 Series04025（2500-wire encoder）	1.0	4	2500	220	4	20A/30A
45	130 Series05025（2500-wire encoder）	1.3	5	2500	220	5	20A/30A
46	130 Series06025（2500-wire encoder）	1.5	6	2500	220	6	30A
47	130 Series07720（2500-wire encoder）	1.6	7.7	2000	220	6	30A
48	130 Series07725（2500-wire encoder）	2.0	7.7	2500	220	7.5	30A
49	130 Series10015（2500-wire encoder）	1.5	10	1500	220	6	30A
50	130 Series10025（2500-wire encoder）	2.5	10	2500	220	10	30A
51	130 Series15015（2500-wire encoder）	2.3	15	1500	220	9.5	30A

Table 2-1 Comparision table of Driver Code and Motor Model

Note: Codes 110, 111, 112, 119 and 151 are designed for special customer use. If rated current above 10A, it is suggested to mount fan for radiation additionally. The remaining are standard codes.

Chapter 3 Motor Specification and Dimension

3.1 Safety Notices

1) Please wipe up anti-rust additive on shaft end before installation.
2) Prevent shaft seat as possible to avoid bearing damage.
3) Be careful to prevent rain penetration and avoid direct sunlight.
4) Motor shall be installed in electrical cabinet to prevent dust, corrosive gas, conductive object and inflammables.
5) Motor shall be installed at place with good ventilation, non-humidity and non-dust.
6) Motor shall be installed at place convenient for maintenance, inspection and clean.
7) When installing/dismounting band wheel, it is not allowed to knock motor or motor shaft to avoid damage encoder. Spiral drawing tool shall be used for dismounting.
8) Servo motor cannot bear big axial or radial load. It is suggested to select spring coupling to connect load.
9) Locking gasket shall be used to fasten motor to prevent motor from loosing.
10) Motor shall be kept from water and oil, because cable immersed in water or oil may take water or oil onto motor body. Be cautious of such case.

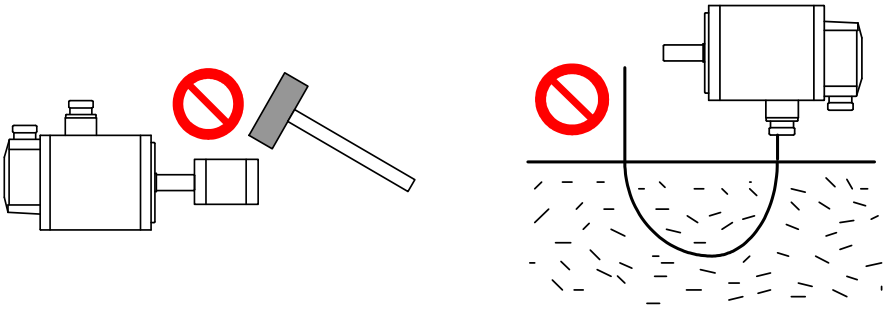


Figure 3-1 Motor Installation Warning

3.2 Parameters of Servo Motor

3.2.1 60 Series Servo Motor

1) Specification

Motor Model	60SD01330ES	60SD01930ES
Rated Power (W)	400	600
Rated Line Voltage(V)	220	220
Rated Line Current (A)	2.8	3.5
Rated Speed (rpm)	3000	3000
Rated Torque (N.m)	1.27	1.91
Peak Torque (N.m)	3.8	5.73
Counter emf (V/1000r/min)	28	28
Torque Coefficient (N.m/A)	0.5	0.55
Rotor Inertia (Kg.m2)	0.302×10^{-4}	0.438×10^{-4}

Motor Model	60SD01330ES	60SD01930ES
Winding (Line) Resistance (Ω)	5.83	3.49
Winding (Line) Inductance (mH)	12.23	8.47
Electric Time Constant (ms)	2.1	2.4
Weight (Kg)	1.33	1.78
Encoder Line Numbers（PPR）	2500	
Insulation Grade	Class B (130℃)	
Protection Grade	IP64	
Service Environment	Ambient Environment：-20℃～+50℃ Ambient Humidity: relative humidity <90% (no-frost condition)	

Winding Lead and Corresponding Number of Motor Winding Socket			
U(red)	V(yellow)	W(blue)	PE(yellow/green/black)
1	2	3	4

Signal Lead Number and Color of Encoder Socket														
5V	0V	B+	Z-	U+	Z+	U-	A+	V+	W+	V-	A-	B-	W-	PE
2	3	4	5	6	7	8	9	10	11	12	13	14	15	1
red	black	green	yellow black	brown	yellow	brown black	blue	grey	white	grey black	blue black	green black	white black	

Table 3-1 60 Series Servo Motor Specification

2) Mounting dimension

60 Series									
Rated Torque (N.m)	LA	LB	LC	LD	E	LF	LG	LZ	S
1.27	122	30	3	7	50	60	70	4.5	14
1.91	146	30	3	7	50	60	70	4.5	14

Table 3-2 60 Series Installing Dimension (Unit: mm)

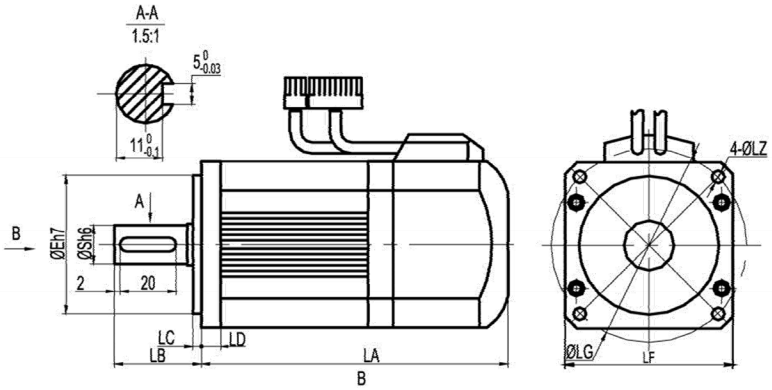


Table 3-2 60 Series Installation Dimension Diagram

3.2.2 80 Series Servo Motor

1) Specification

Motor Model	80SD01330ES	80SD02430ES	80SD03520ES	80SD04025ES
Rated Power (KW)	0.4	0.75	0.73	1.0
Rated Line Voltage (V)	220	220	220	220
Rated Line Current (A)	2	3	3	4.4
Rated Speed (rpm)	3000	3000	2000	2500
Rated Torque (N.m)	1.27	2.39	3.5	4
Peak Torque (N.m)	3.8	7.1	10.5	12
Peak Current（A）	6	9	9	13.2
Counter emf (V/1000r/min)	40	48	71	56
Torque Coefficient (N.m/A)	0.64	0.8	1.17	0.9
Rotor Inertia ($Kg.m^2$)	1.32×10^{-4}	2.4×10^{-4}	3×10^{-4}	3.5×10^{-4}
Winding (Line) Resistance (Ω)	4.44	2.88	3.65	1.83
Winding (Line) Inductance(mH)	7.93	6.4	8.8	4.72
Electric Time Constant(ms)	1.66	2.22	2.4	2.58
Weight(Kg)	1.78	2.86	3.7	3.8
Encoder Line Numbers(PP R)	2500			
Insulation Grade	Class B(130℃)			
Protection Grade	IP65			
Service Environment	Ambient Environment：-20℃～+50℃ Ambient Humidity: relative humidity <90% (no frost condition)			

Winding Lead and Corresponding Number of Motor Winding Socket			
U(red)	V(yellow)	W(blue)	PE(yellow/green/black)
1	2	3	4

Signal Lead Number and Color of Encoder Socket														
5V	0V	B+	Z-	U+	Z+	U-	A+	V+	W+	V-	A -	B-	W-	PE
2	3	4	5	6	7	8	9	10	11	12	13	14	15	1
red	black	green	yellowblack	brown	yellow	brown black	blue	grey	white	grey black	blue black	green black	white black	

Table 3-3 80 Series Servo Motor Specification

2) Installing Dimension

80 Series	
Model	L
80SD01330ES	123
80SD02430ES	150
80SD03520ES	178
80SD04025ES	190

Table 3-4 80 Series Installing Dimension (Unit: mm)

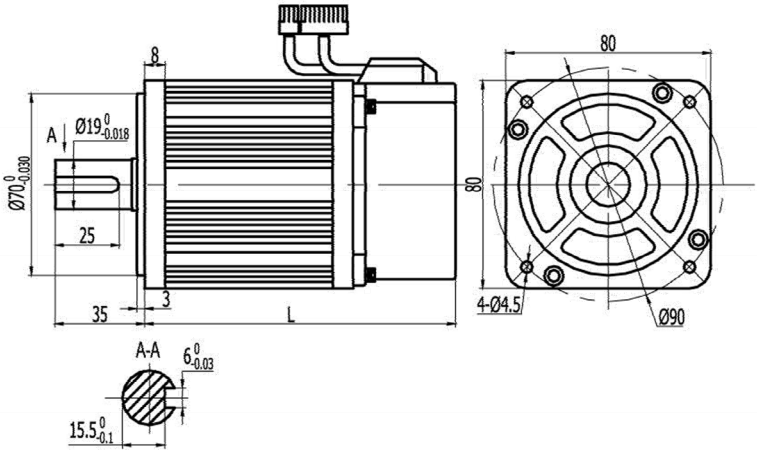


Figure 3-3 80 Series Installing Dimension Diagram

3.2.3 90 Series Servo Motor

1) Specification

Motor Model	900SD02430ES	90SD03520ES	90SD04025ES
Rated Power(KW)	0.75	0.73	1.0
Rated Line Voltage(V)	220	220	220
Rated Line Current(A)	3	3	4
Rated Speed(rpm)	3000	2000	2500
Rated Torque(N.m)	2.4	3.5	4
Peak Torque(N.m)	7.1	10.5	12
Peak Current(A)	9	7.5	12
Counter emf(V/1000r/min)	51	67	60
Torque Coefficient(N.m/A)	0.8	1.2	1.0
Rotor Inertia($Kg.m^2$)	2.45×10^{-4}	3.4×10^{-4}	3.7×10^{-4}
Winding (Line) Resistance (Ω)	3.2	4.06	2.69
Winding (Line) Inductance(mH)	7.0	9.7	6.21
Electric Time Constant(Ms)	2.2	2.39	2.3
Weight(Kg)	3.4	3.8	4.13
Encoder Line Numbers(PP R)	2500		
Insulation Grade	Class B(130℃)		
Protection Grade	IP65		
Service Environment	Ambient Environment：-20℃～+50℃ Ambient Humidity; relative humidity<90% (no frost condition)		
Winding Lead and Corresponding Number of Motor Winding Socket			
U(red)	V(yellow)	W(blue)	PE(yellow/green/black)
1	2	3	4
Signal Lead Number and Color of Encoder Socket			

Motor Model				900SD02430ES				90SD03520ES			90SD04025ES			
5V	0V	B+	Z-	U+	Z+	U-	A+	V+	W+	V-	A-	B-	W-	PE
2	3	4	5	6	7	8	9	10	11	12	13	14	15	1
red	black	green	yellow black	brown	yellow	brown black	blue	grey	white	grey black	blue black	green black	white black	

Table 3-5 90 Series Servo Motor Specification

2) Installing Dimension

90 Series	
Model	L
90SD02430ES	149
90SD03520ES	171
90SD04025ES	181

Table 3-6 90 Series Installing Dimension（Unit：mm）

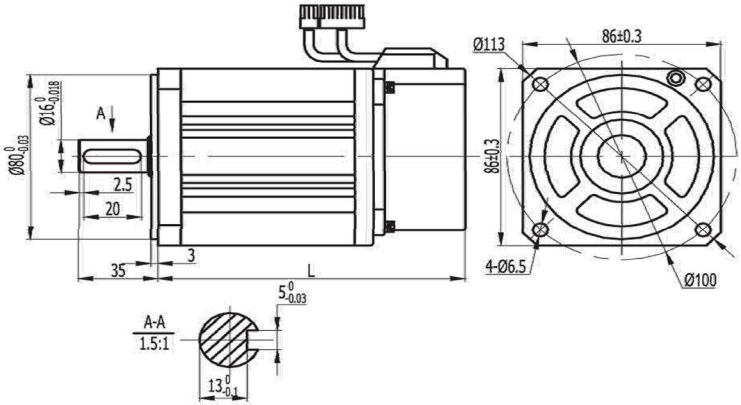


Figure 3-4 90 Series Installing Dimension Diagram

3.2.4 110 Series Servo Motor

1) Specification

Motor Model	110SD02030ES	110SD04030ES	110SD04030ES	110SD06020ES	110SD06030ES
Rated Power(KW)	0.6	1.2	1.5	1.2	1.8
Rated Line Voltage(V)	220	220	220	220	220
Rated Line Current(A)	2.5	5.0	6.0	4.5	6.0
Rated Speed(rpm)	3000	3000	3000	2000	3000
Rated Torque(N.m)	2	4	5	6	6
Peak Torque(N.m)	6	12	15	12	18
Counter emf(V/1000r/min)	56	64	62	83	60
Torque Coefficient(N.m/A)	0.8	0.8	0.83	1.3	1.0

Motor Model	110SD02030ES	110SD04030ES	110SD04030ES	110SD06020ES	110SD06030ES
Rotor Inertia(Kg.m^2)	0.31×10^{-3}	0.54×10^{-3}	0.63×10^{-3}	0.76×10^{-3}	0.76×10^{-3}
Winding (Line) Resistance (Ω)	3.6	1.09	1.03	1.46	0.81
Winding (Line) Inductance(mH)	8.32	3.3	3.43	4.7	2.59
Electric Time Constant(ms)	2.3	3.0	3.33	3.2	3.2
Weight(Kg)	4.5	5.5	6.1	6.7	6.7
Encoder Line Numbers(PPR)	2500				
Insulation Grade	Class B(130℃)				
Protection Grade	IP65				
Service Environment	Ambient Environment：-20℃～+50℃ relative humidity<90%(no frost condition)				

Winding Lead and Corresponding Number of Motor Winding Socket			
U(red)	V	W	PE
1	2	3	4

Signal Lead Number and Color of Encoder Socket														
5V	0V	B+	Z-	U+	Z+	U-	A+	V+	W+	V-	A-	B-	W -	PE
2	3	4	5	6	7	8	9	10	11	12	13	14	15	1
red	black	green	yellow black	brown	yellow	brownblack	blue	grey	white	grey black	blue black	green black	white black	

Table 3-7 110 Series Servo Motor Specification

2) Installing Dimension

110 Series				
Rated Torque(N.m)	2	4	5	6
LA	159	189	204	219
LB	55	55	55	55
LC	5	5	5	5
LD	12	12	12	12
LE	95	95	95	95
LF	110	110	110	110
LG	130	130	130	130
LZ	9	9	9	9
S	19	19	19	19
H	21.5	21.5	21.5	21.5
W	6	6	6	6

Table 3-8 110 Series Installing Dimension(Unit: mm)

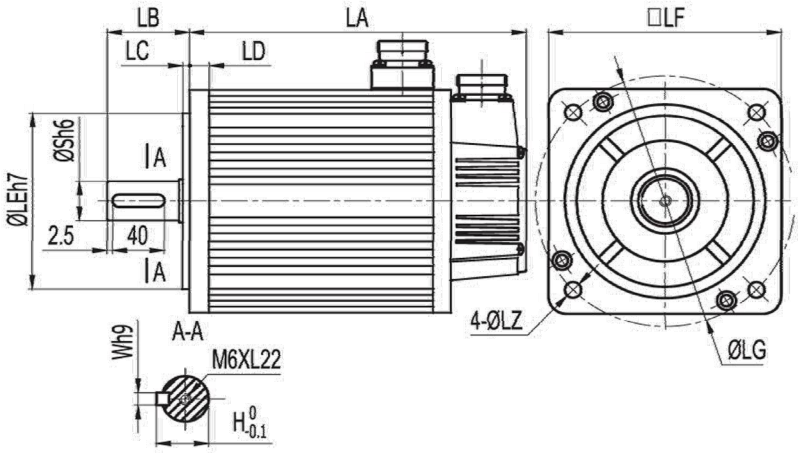


Table 3-5 110 Series Installing Dimension Diagram

3.2.5 130 Series Servo Motor

1) Specification

Motor Model	130SD04025ES	130SD05025ES	130SD06025ES	130SD07025ES
Rated Power(KW)	1.0	1.3	1.5	2.0
Rated Line Voltage(V)	220	220	220	220
Rated Line Current(A)	4.0	5.0	6.0	7.5
Rated Speed(rpm)	2500	2500	2500	2500
Rated Torque(N.m)	4	5	6	7.7
Peak Torque(N.m)	12	15	18	22
Counter emf(V/1000r/min)	72	68	65	68
Torque Coefficient(N.m/A)	1.0	1.0	1.0	1.03
Rotor Inertia(Kg.m^2)	0.85×10^{-3}	1.06×10^{-3}	1.26×10^{-3}	1.53×10^{-3}
Winding (Line) Resistance (Ω)	2.76	1.84	1.21	1.01
Winding (Line) Inductance(mH)	6.42	4.9	3.87	2.94
Electric Time Constant(ms)	2.32	2.66	3.26	3.80
Weight(Kg)	7.7	8.2	8.9	10
Rated Power(KW)	1.0	1.3	1.5	2.0
Rated Line Voltage(V)	220	220	220	220
Rated Line Current(A)	4.0	5.0	6.0	7.5
Encoder Line Numbers(PP R)	2500			
Insulation Grade	Class B(130℃)			
Protection Grade	IP65			
Service Environment	Ambient Environment：-20℃～+50℃ relative humidity<90%(no frost condition)			

Winding Lead and Corresponding Number of Motor Winding Socket			
U	V	W	PE
2	3	4	1

Motor Model				130SD04025ES			130SD05025ES			130SD06025ES		130SD07025ES		
Signal Lead No. of Encoder Socket														
5V	0V	B+	Z-	U+	Z+	U-	A+	V+	W+	V-	A-	B-	W-	PE
2	3	4	5	6	7	8	9	10	11	12	13	14	15	1

Motor Model	130SD10015ES	130SD10025ES	130SD15015ES
Rated Power(KW)	1.5	2.6	2.3
Rated Line Voltage(V)	220	220	220
Rated Line Current(A)	6.0	10	9.5
Rated Speed(rpm)	1500	2500	1500
Rated Torque(N.m)	10	10	15
Peak Torque(N.m)	25	25	30
Counter emf(V/1000r/min)	103	70	114
Torque Coefficient(N.m/A)	1.67	1.0	1.58
Rotor Inertia($Kg.m^2$)	1500	2500	1500
Winding (Line) Resistance (Ω)	10	10	15
Winding (Line) Inductance(mH)	25	25	30
Electric Time Constant(ms)	103	70	114
Weight(Kg)	1.67	1.0	1.58
Rated Power(KW)	1.94×10^{-3}	1.94×10^{-3}	2.77×10^{-3}
Rated Line Voltage(V)	1.29	0.73	1.1
Rated Line Current(A)	5.07	2.45	4.45
Encoder Line Numbers(PP R)	2500		
Insulation Grade	Class B(130℃)		
Protection Grade	IP65		
Service Environment	Ambient Environment：-20℃～+50℃ relative humidity<90% (no frost condition)		
Winding Lead and Corresponding Number of Motor Winding Socket			
U	V	W	PE
2	3	4	1

Signal Lead No. of Encoder Socket														
5V	0V	B+	Z-	U+	Z+	U-	A+	V+	W+	V-	A-	B-	W-	PE
2	3	4	5	6	7	8	9	10	11	12	13	14	15	1

Table 3-9 130 Series Servo Motor Specification

2) Installing Dimension

130 Series								
Rated Torque （N.m）	4	5	6	7.7	10			15
					1000rpm	1500rpm	2500rpm	
LA	166	171	179	192	213		209	241
LB	57	57	57	57	57			57
LC	5	5	5	5	5			5
LD	14	14	14	14	14			14
LE	110	110	110	110	110			110
LF	130	130	130	130	130			130
LG	145	145	145	145	145			145
LZ	9	9	9	9	9			9
S	22	22	22	22	22			22
H	24.5	24.5	24.5	24.5	24.5			24.5
W	6	6	6	6	6			6

Table 3-10 130 Series Installing Dimension（Unit：mm）

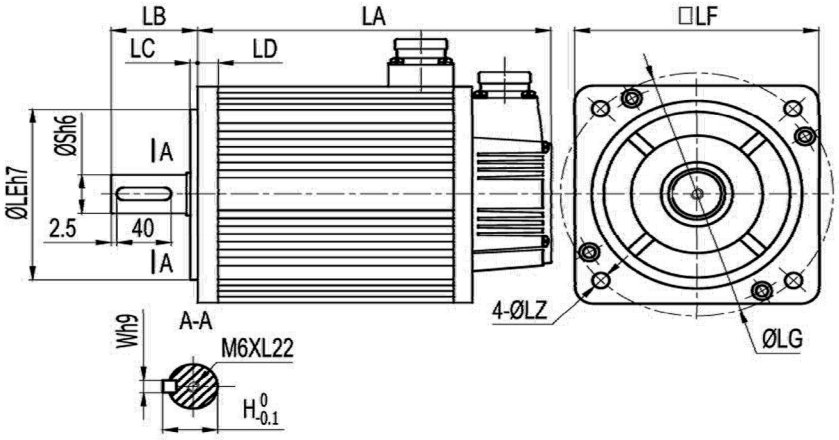


Figure 3-6 130 Series Installing Dimension Diagram

3.2.6 180 Series Servo Motor

1) Specification

Motor Model	180SD17215ES		180SD19015ES		180SD21520ES		180SD27010ES	
Rated power (KW)	2.7		3.0		4.5		2.9	
Rated linear voltage (V)	220	380	220	380	220	380	220	380
Rated linear current (A)	10.5	6.5	12	7.5	16	9.5	12	7.5
Rated speed (rpm)	1500		1500		2000		1000	
Rated torque (N.m)	17.2		19		21.5		27	
Peak Torque(N.m)	43		47		53		67	
Counter emf(V/1000r/min)	112	167	97	158	84	140	138	224

Motor Model	180SD17215ES		180SD19015ES		180SD21520ES		180SD27010ES	
Torque Coefficient(N.m/A)	1.64	2.65	1.58	2.5	1.34	2.26	2.25	3.6
Rotor Inertia($Kg.m^2$)	3.4×10^{-3}		3.8×10^{-3}		4.7×10^{-3}		6.1×10^{-3}	
Winding (Line) Resistance (Ω)	0.7	1.47	0.4	1.15	0.24	0.71	0.48	1.37
Winding (Line) Inductance(mH)	3.5	7.8	2.42	6.4	1.45	4	3.26	8.6
Electric Time Constant(ms)	5	5.3	6	5.57	6	5.6	6.79	6.27
Weight(Kg)	19.5		20.5		22.2		25.5	
Encoder Line Numbers(PPR)	2500							
Insulation Grade	Class B(130℃)							
Protection Grade	IP65							
Service Environment	Ambient Environment：-20℃～+50℃ relative humidity<90%(no frost condition)							

Winding Lead and Corresponding Number of Motor Winding Socket			
U	V	W	PE
2	3	4	1

Signal Lead No. of Encoder Socket														
5V	0V	B+	Z-	U+	Z+	U-	A+	V+	W+	V-	A-	B-	W-	PE
2	3	4	5	6	7	8	9	10	11	12	13	14	15	1

Motor Model	180SD027015ES		180SD35010ES		180SD35015ES		180SD48015ES	
Rated Power(KW)	4.3		3.7		5.5		7.5	
Rated Line Voltage(V)	220	380	220	380	220	380	220	380
Rated Line Current(A)	16	10	16	10	19	12	32	20
Rated Speed(rpm)	1500		1000		1500		1500	
Rated Torque(N.m)	27		35		35		48	
Peak Torque(N.m)	67		70		70		96	
Counter emf(V/1000r/min)	103	172	134	223	113	181	94	156
Torque Coefficient(N.m/A)	1.69	2.7	2.2	3.5	1.84	2.9	1.5	2.4
Rotor Inertia($Kg.m^2$)	6.1×10^{-3}		8.6×10^{-3}		8.6×10^{-3}		9.5×10^{-3}	
Winding (linear) volt.(Ω)	0.28	0.796	0.31	0.93	0.21	0.62	0.104	0.273
Winding (linear) current (mH)	1.74	4.83	3.28	9.1	1.57	4	0.77	2.14
Electric Time Constant(ms)	6.2	6	10.58	9.78	7.47	6.45	7.4	7.8
Weight(Kg)	25.5		30.5		30.5		40	
Encoder Line Numbers(PPR)	2500							
Insulation Grade	Class B(130℃)							
Protection Grade	IP65							
Service Environment	Ambient Environment：-20℃～+50℃ relative humidity<90%(no frost condition)							

Winding Lead and Corresponding Number of Motor Winding Socket			
U(red)	V(yellow)	W(blue)	PE(yellow/green/black)
1	2	3	4

Motor Model		180SD027015ES		180SD35010ES		180SD35015ES		180SD48015ES						
Signal Lead No. of Encoder Socket														
5V	0V	B+	Z-	U+	Z+	U-	A+	V+	W+	V-	A -	B-	W -	PE
2	3	4	5	6	7	8	9	10	11	12	13	14	15	1

Table 3-11 180 Series Servo Motor Specification

2) Installing Dimension

Specification	17.2N.m	19N.m	21.5N.m	27 N.m	35N.m	48N.m
LA	226	232	243	262	292	346

Table 3-12 180 Series Installing Dimension（Unit：mm）

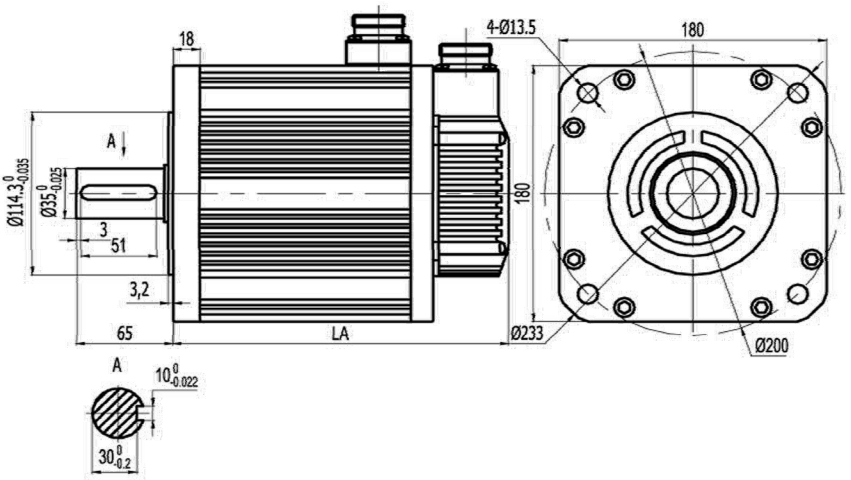


Table 3-7 180 Series Installing Dimension Diagram

Chapter 4 Driver Specification and Dimension

4.1 Driver Specification

4.1.1 W Series

<table>
<tr><td>Output power（kW）</td><td>0.4～1.0</td><td>1.0~2.5</td><td>Monitoring function</td><td>Rotary speed/current position/command pulse accumulation/position deviation/motor torque/motor current/operation status etc.</td></tr>
<tr><td>Input source of main circuit *1</td><td>single phase AC220V-15%～+10%50/60Hz</td><td>single phase/3-phase AC220V-15%～+10%50/60Hz</td><td>Control mode</td><td>①Position Control Mode ②Internal Speed Control Mode ③External speed control mode④ commissioning way ⑤motor zero test mode ⑥ motor load inertia measure mode</td></tr>
<tr><td>Input power of control circuit</td><td colspan="2">single phase AC220V-15%～+10%50/60Hz</td><td rowspan="2">Control input</td><td rowspan="2">①Servo-on ②Alarm clear ③deviation counter reset/Speed selection1 ④command pulse inhibit/Speed selection 2
⑤CCW drive inhibit ⑥CW drive inhibit</td></tr>
<tr><td>Protection function</td><td colspan="2">overspeed/main power voltage /underpressure/overcurrent/overload/brake abnormality/encoder abnormality/control power abnormality/position too poor</td></tr>
<tr><td>Dynamic braking</td><td colspan="2">built-in</td><td rowspan="4">Control features</td><td>Speed frequency response: 200Hz or higher</td></tr>
<tr><td>Control output</td><td colspan="2">Servo ready output/Servo alarm output/band-type brake release/pulse feedback output</td><td>Speed fluctuation ratio: ＜±0.03 （load: 0%～100%）:
＜±0.02（Power: -15%～+10%）（Values corresponding to rated speed）</td></tr>
<tr><td></td><td colspan="2"></td><td>Speed ratio: 1:5000</td></tr>
<tr><td>Applicable load</td><td colspan="2">Less than 5 times of motor inertia</td><td rowspan="2">Pulse frequency：≤500kHz</td></tr>
<tr><td>Display</td><td colspan="2">6-digit LED digital tube and 4 keys</td><td>Control features</td></tr>
<tr><td rowspan="3">Position control</td><td>Input mode</td><td colspan="3">①Pulse+ direction ②CCW pulse/CW pulse ③A/B 2-phase qurdrature pulse</td></tr>
<tr><td>Input electronic gear ratio</td><td colspan="3">numerator：1～32767 denominator：1～32767</td></tr>
<tr><td>Output electronic gear</td><td colspan="3">According to No. 50 parameter setting, output pulse range of each rotation is（1~10000 ）</td></tr>
</table>

Table 4-1 W Series Driver Specification

*1. If actual working power of the driver is over 1.0KW, recommend to use 3-phase AC220V input power source.

4.1.2 F Series

<table>
<tr><td>Output power（kW）</td><td>0.4 ～1.5</td><td>Monitoring function</td><td>Rotary speed/current position/command pulse accumulation/position deviation/motor torque/motor current/operation status etc.</td></tr>
<tr><td>Input power</td><td>single phase AC220V-15%～+10%50/60Hz</td><td>Control Mode</td><td>①Position Control Mode ②Internal Speed Control Mode ③External speed control mode④commissioning way ⑤motor zero test mode ⑥motor load inertia measure mode</td></tr>
<tr><td>Dynamic braking</td><td>built-in</td><td rowspan="2">Control input</td><td rowspan="2">①Servo-on ②Alarm clear ③deviation counter reset/Speed selection1 ④command pulse inhibit/Speed selection 2
⑤CCW drive inhibit ⑥CW drive inhibit</td></tr>
<tr><td>Protection function</td><td>Servo ready output/Servo alarm output/band-type brake release/pulse feedback output</td></tr>
<tr><td>Structure</td><td>Structure A</td><td rowspan="3">Control features</td><td>Speed frequency response：200Hz or more</td></tr>
<tr><td>Control output</td><td>Servo ready output/Servo alarm output/band-type brake release/pulse feedback output</td><td>Speed fluctuation ratio：＜±0.03 （load 0%～100%）:
＜±0.02（power -15%～+10%）（Values corresponding to rated speed）</td></tr>
<tr><td>Dimension</td><td>175×85×170 （mm）</td><td>Speed ratio：1:5000</td></tr>
</table>

Applicable load	Less than 5 times of motor inertia		Pulse frequency：≤500kHz
Display	6-digit LED digital tube and 4 keys		
Position control	Input mode	①Pulse+ direction ②CCW pulse/CW pulse ③A/B 2-phase qurdrature pulse	
	electronic gear ratio	numerator：1～32767 denominator：1～32767	
	Encoder feedback	2500p/r（resolution：10000 ）incremental encoder	

Table 4-2 F Series Driver Specification

4.1.3 P Series

Output power（kW）	0.4～1.0	1.0~1.5	Monitoring function	Rotary speed/current position/command pulse accumulation/position deviation/motor torque/motor current/operation status etc.
Input source of main circuit*1	single phase AC220V-15%～+10%50/60Hz	single phase/3-phase AC220V-15%～+10%50/60Hz	Control Mode	①Position Control Mode ②Internal Speed Control Mode ③External speed control mode④ commissioning way ⑤motor zero test mode ⑥ motor load inertia measure mode
Input power of control circuit	single phase AC220V-15%～+10%50/60Hz		Control input	①Servo-on ②Alarm clear ③deviation counter reset/Speed selection1 ④command pulse inhibit/Speed selection 2 ⑤CCW drive inhibit ⑥CW drive inhibit
Protection function	overspeed/main power voltage /underpressure/overcurrent/overloaded/brake abnormality/encoder abnormality/control power abnormality/position too poor			
Dynamic braking	built-in		Control features	Speed frequency response：200Hz or more
Control output	Servo ready output/Servo alarm output/band-type brake release/pulse feedback output			Speed fluctuation ratio：＜±0.03（load 0%～100%）：＜±0.02（power -15%～+10%）（Values corresponding to rated speed）
				Speed ratio：1:5000
Applicable load	Less than 5 times of motor inertia			Pulse frequency：≤500kHz
Display	6-digit LED digital tube and 4 keys			
Position control	Input mode	①Pulse+ direction ②CCW pulse/CW pulse ③A/B 2-phase qurdrature pulse		
	Input electronic gear ratio	numerator：1～32767 denominator：1～32767		
	Output electronic gear	According to No. 50 parameter setting, output pulse range of each rotation is（1~10000 ）		

Table 4-3 P Series Driver Specification

4.2 Installation Environment for Servo Driver

4.2.1 Protection

Servo motor h protection capability itself. Therefore, it shall be installed in the electrical cabinet under good protection and be kept away from corrosive/inflammable gas, conductive objects, metal dust, oil mist and liquid.

4.2.2 Temperature and Humidity

Ambient environment for servo driver is 0～55℃ and the temperature for long-term working is under 45℃, for which the driver shall be mounted according to the required direction and interval in addition to good radiation.

4.2.3 Vibration and Shock

Vibration shall be avoided for driver installation or kept under 0.5g (4.9m/S2) by damping measure. No heavy load or shock shall be applied to the driver during installation.

4.2.4 Firefighting

Servo motor shall not be installed on or near to inflammable object, or else it may cause fire.

Item	EVTA W Series Servo Motor
Service temperature Service humidity	0℃～55℃（no frost） ≤90%RH（no condensation）
Storage/transport temperature Storage/transport humidity	-40℃～80℃ ≤90%RH（no condensation）
Atmospheric evironment	No corrosive/inflammable gas, oil mist or liquid in the control cabinet.
Altitude	under 1000m
Vibration	≤0.5g(4.9m/s2) 10Hz～60Hz
Atmospheric pressure	86kP a～106kPa
Protection Grade	IP43

Table 4-4 Service Environment of Servo Motor

4.3 Driver Installation

4.3.1 Installation Dimension of Driver

User can adopt either floor installation mode or panel installation mode to install the driver vertical to the installation surface. Natural convection wind or fan shall be used to cool down the servo driver.

Please be sure to observe the requirement s on installation direction. Servo driver shall be fixed firmly on the installation surface through installing holes on chassis.

4.3.2 Installation Interval of Driver

To ensure to cool the servo driver by natural convection wind or by fan, please reserve sufficient space around the servo driver as shown in Figure 4-1.

If several drivers are mounted in parallel, to ensure good radiation condition, much big space shall be reserved between them as possible in practical installation. It is suggested to reserve 100mm or more gap between both sides crosswise (if limited by installation space, no space can be left) while 100mm or more between both sides lengthways. Interval between two drivers shall be 25mm or more as shown in Figure 4-2.

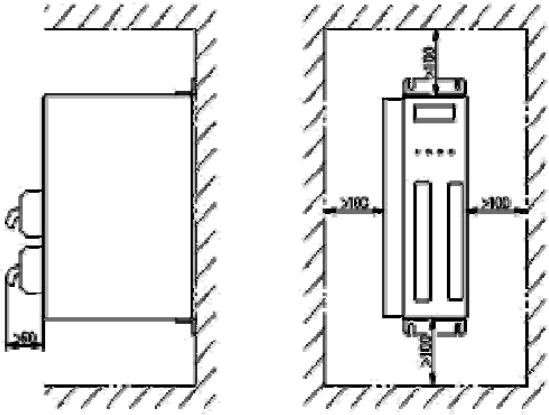


Figure 4-1 Installing Interval of Single Driver

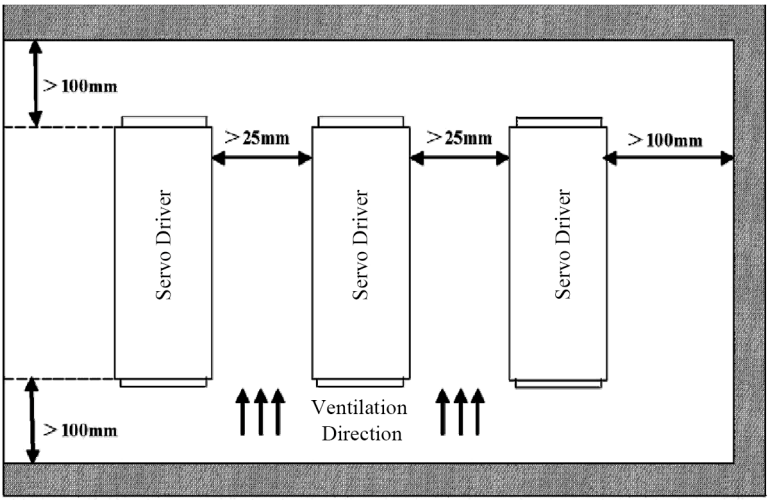


Figure 4-2 Installing Interval of Multiple Drivers

Note: to ensure that the ambient temperature of servo driver will not rise continuously, radiator with convection air shall be equipped in the cabinet.

4.4 Dimension Drawing of Servo Driver

4.4.1 W Series

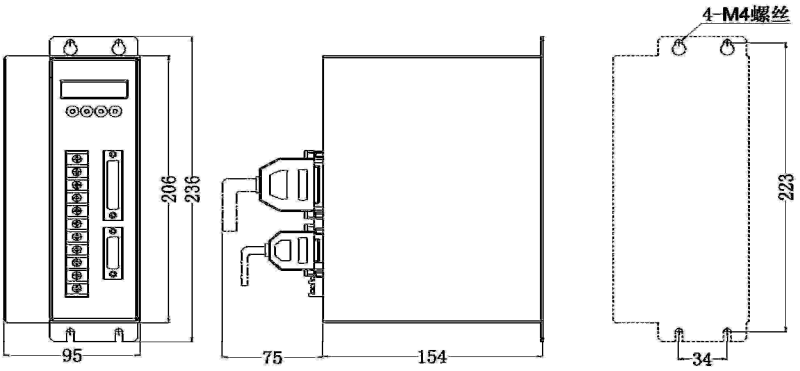


Figure 4-3 W Series Outline Dimension Drawing

4.4.2 F Series

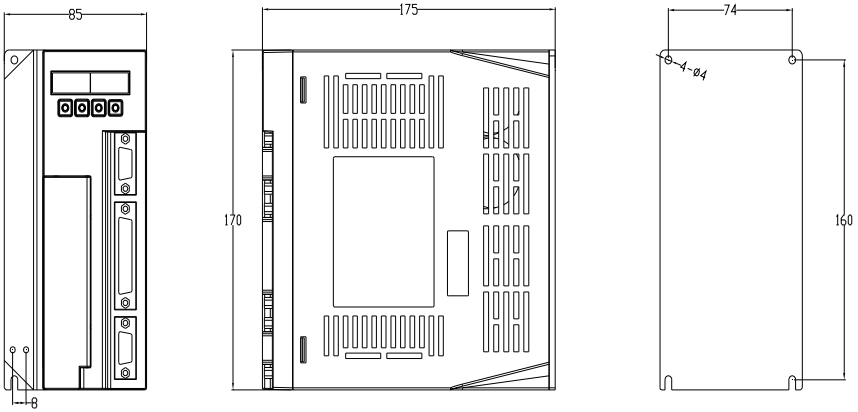


Figure 4-4 F Series Outline Dimension Drawing

4.4.3 P Series

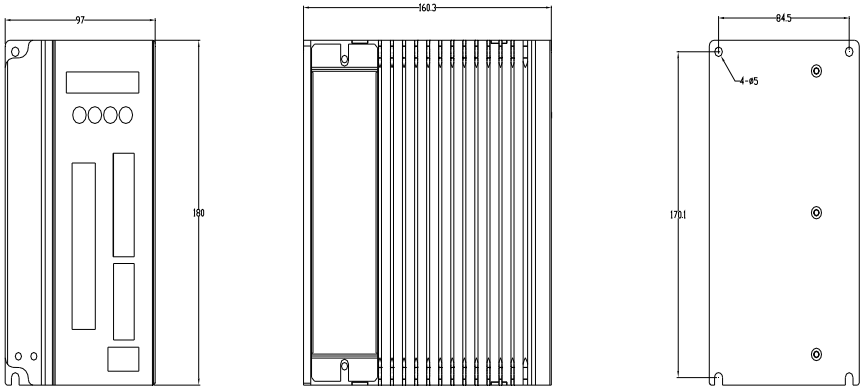


Figure 4-5 P Series Outline Dimension Drawing

Chapter 5 Wiring

5.1 Control Wiring Diagram

5.1.1 W Series Control Wiring Diagram

1) Position Control Wiring Diagram

Servo driver adopts 3-phase AC 220V power source, generally obtained by 3-phase 380V voltage transformation through 3-phase isolation transformer. Motor less than 1KW can use single-phase AC220V power supply (single power supply connected to Rand T with S hung in the air).

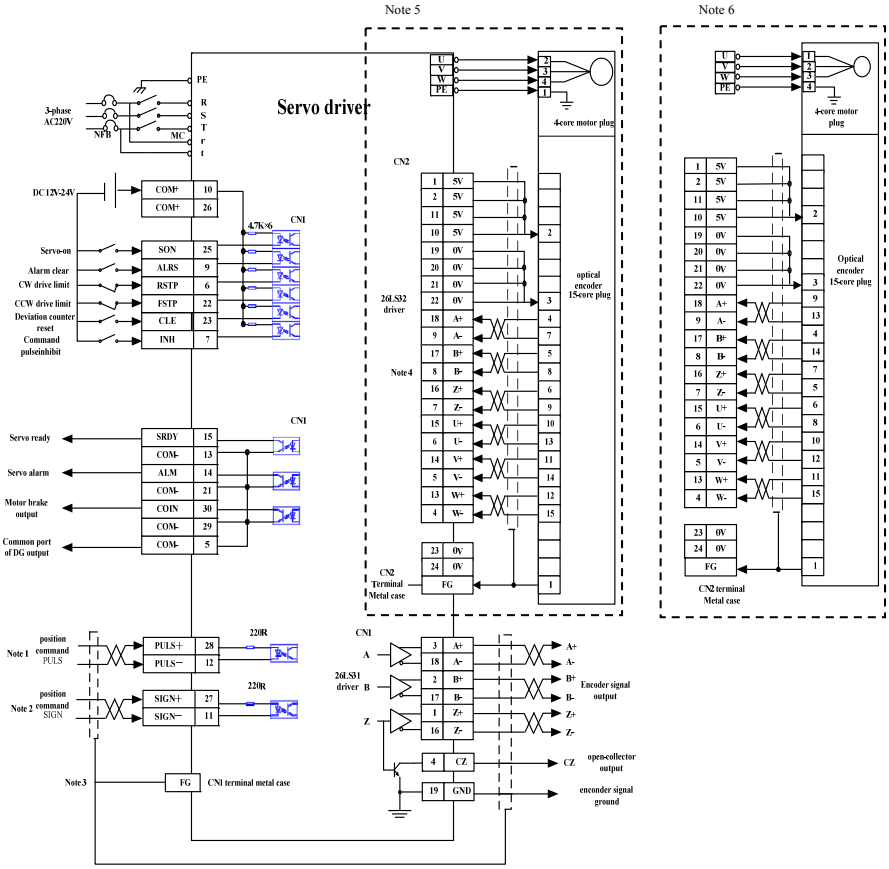


Figure 5-1 W Series Position Control Wiring Diagram

Notes 1 and 2: As for upper computer pulse, if waveform amplitude of directional signal is 24V, it shall be cascaded with 1.2KΩ--2KΩ resistance; if the amplitude is 12V, it shall be cascaded with 510Ω--810Ω resistance.

Note 3: shielding line between CN1 wiring terminal and upper computer shall be grounded reliably at both ends.

Note 4: CN2 shall be connected with WELLTEC wire-saving motor with 18-pin of CN2 connected to signal A- of encoder and 9-pin of CN2 to signal A+ of encoder.

Note 5: The wiring mode is suitable for SD series servo motors of no. 110 and 130 engine frames.

Note 6: The wiring mode is suitable for SD series servo motors of no. 60, 80 and 90 engine frames.

2) Speed Control Wiring Diagram

Servo driver adopts 3-phase AC 220V power supply, generally obtained by 3-phase 380V transformation through 3-phase isolation transformer. Motor less than 1kw can adopt single-phase AC 220V power supply (single phase power connected to R and T with S hung in the air.)

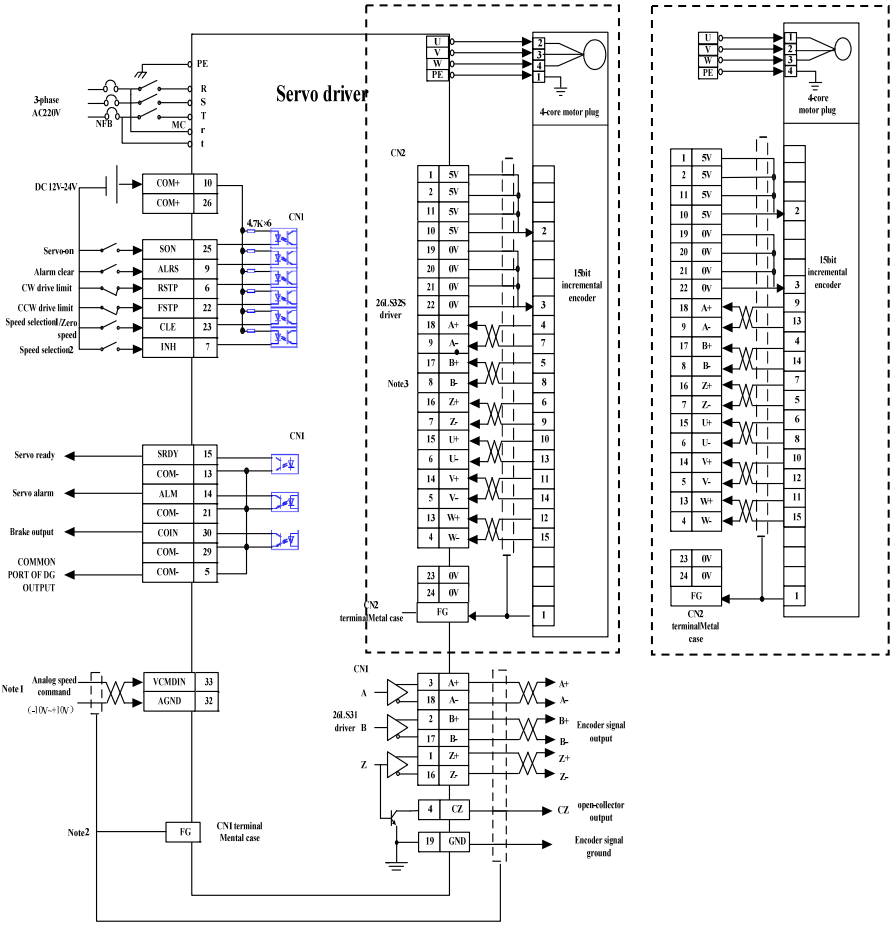


Figure 5-2 W Series Speed Control Wiring Diagram

Note 1: please pay special attention that: original software version such as 1.09 series products have position and internal speed control modes but without external analog input .

New software version begins with “C ” such as C 1.09, and new products add external input mode at the original frame. Please do select proper function as required.

Note 2: shielding line between CN1 wiring terminal and upper computer shall be grounded reliably at both ends.

Note 3: CN2 shall be connected with WELLTEC wire-saving motor with 18-pin of CN2 connected to signal A- of encoder and 9-pin of CN2 to signal A+ of encoder.

Note 4: The wiring mode is suitable for SD series servo motors of no. 110 and 130 engine frames.

Note 5: The wiring mode is suitable for SD series servo motors of no. 60, 80 and 90 engine frames.

5.1.2 F Series Control Wiring Diagram

1) Position Control Wiring Diagram

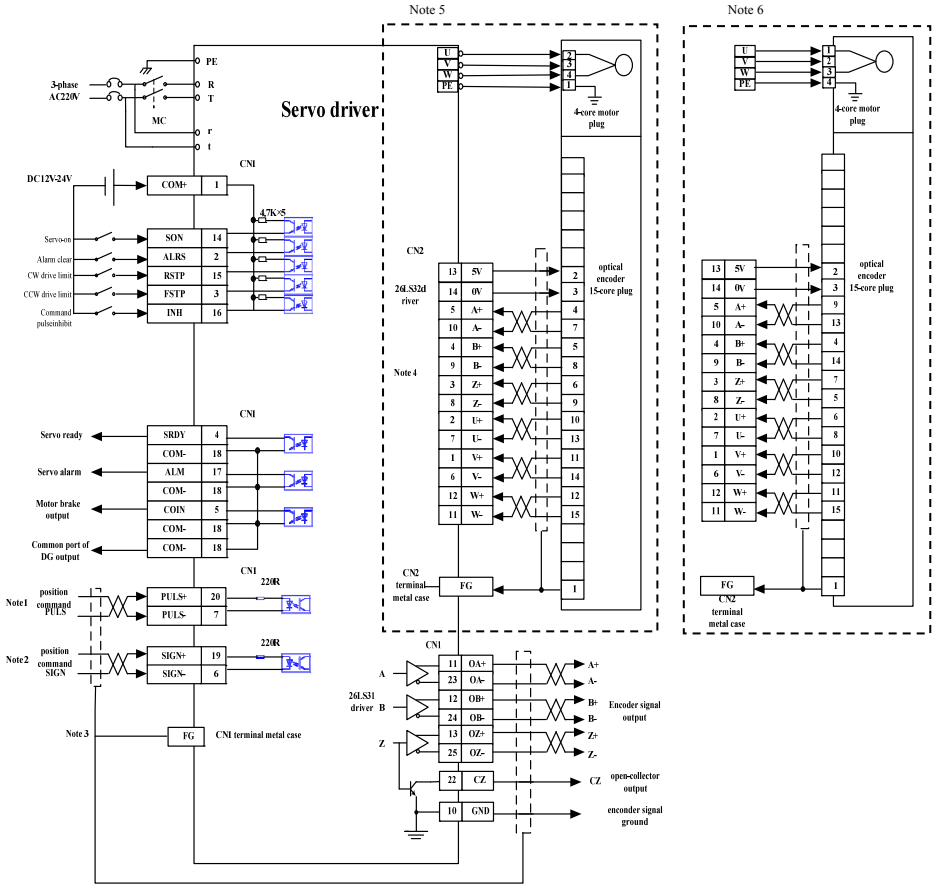


Figure 5-3 F Series Position Control Wiring Diagram

Notes 1 and 2: As for upper computer pulse, if waveform amplitude of directional signal is 24V, it shall be cascaded with 1.2KΩ--2KΩ resistance; if the amplitude is 12V, it shall be cascaded with 510Ω--810Ω resistance.

Note 3: shielding line between CN1 wiring terminal and upper computer shall be grounded reliably at both ends.

Note 4: CN2 shall be connected with WELLTEC wire-saving motor (including compatible WELLTEC wiring-saving motor) with 10-pin of CN2 connected to signal A- of encoder and 5-pin of CN2 to signal A+ of encoder.

Note 5: The wiring mode is suitable for SD series servo motors of no. 110 and 130 engine frames.

Note 6: The wiring mode is suitable for SD series servo motors of no. 60, 80 and 90 engine frames.

2) Speed Control Wiring Diagram

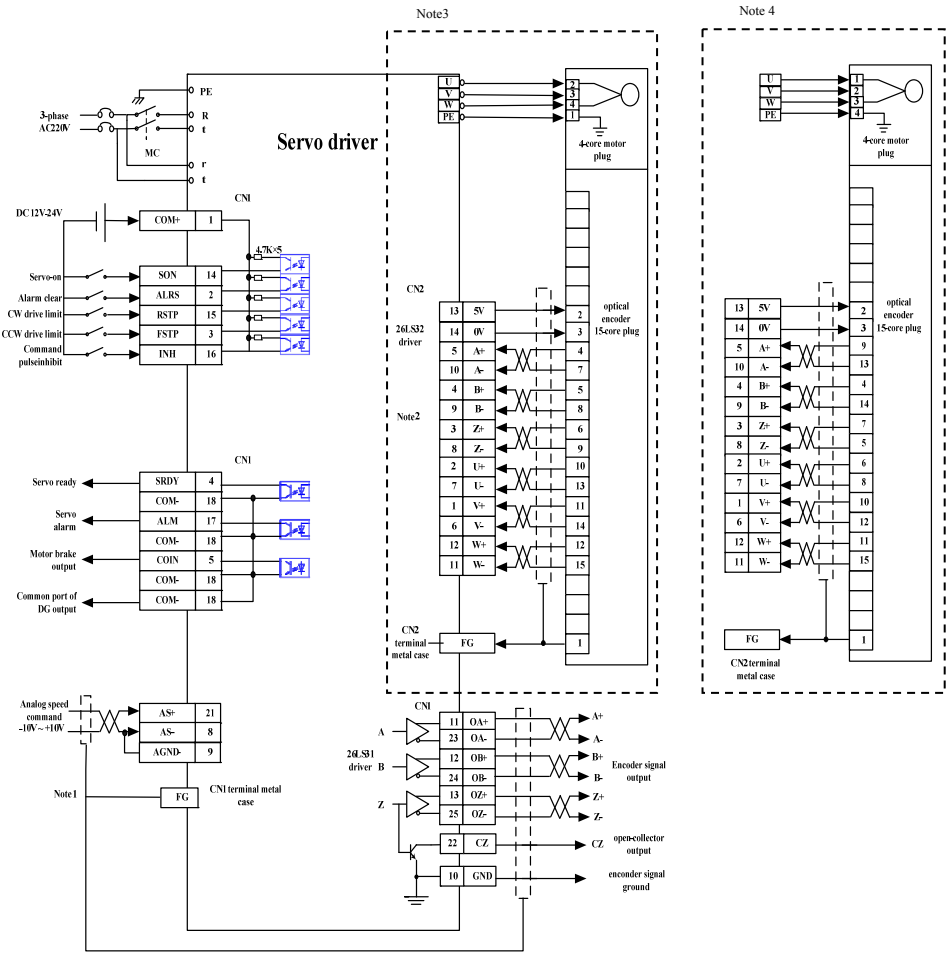


Figure 5-4 F Series Speed Control Wiring Diagram

Note 1: shielding line between CN1 wiring terminal and upper computer shall be grounded reliably at both ends.

Note 2: CN2 shall be connected with WELLTEC wire-saving motor (including compatible WELLTEC wiring-saving motor) with 10-pin of CN2 connected to signal A- of encoder and 5-pin of CN2 to signal A+ of encoder.

Note 3: The wiring mode is suitable for SD series servo motors of no. 110 and 130 engine frames.

Note 4: The wiring mode is suitable for SD series servo motors of no. 60, 80 and 90 engine frames.

5.1.3 P Series Control Wiring Diagram

1) Position Control Wiring Diagram

Servo driver adopts 3-phase AC 220V power supply, generally obtained by 3-phase 380V transformation through 3-phase isolation transformer. Motor less than 1kw can adopt single-phase AC 220V power supply (single phase power connected to R and T with S hung in the air.)

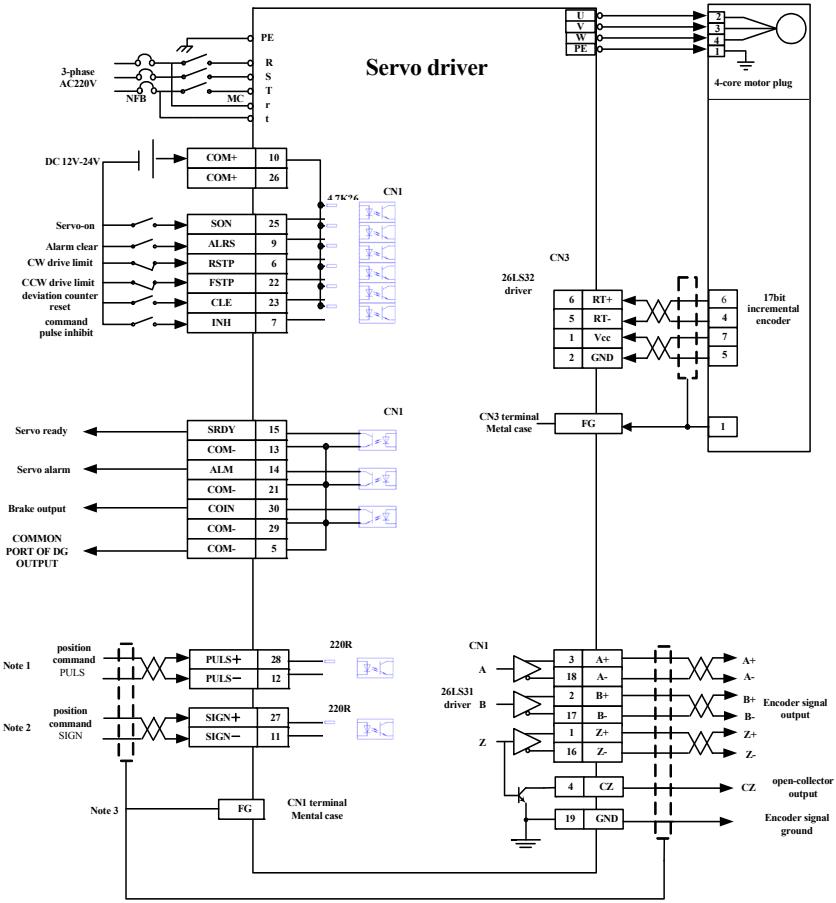


Figure 5-5 P Series Position Control Wiring Diagram

Notes 1: As for upper computer pulse, if waveform amplitude of directional signal is 24V, it shall be cascaded with 1.2KΩ--2KΩ resistance; if the amplitude is 12V, it shall be cascaded with 510Ω--810Ω resistance.

Note 2: The same as Note 1.

Note 3: shielding line between CN1 wiring terminal and upper computer shall be grounded reliably at both ends.

2) Position Control Wiring Diagram

Servo driver adopts 3-phase AC 220V power supply, generally obtained by 3-phase 380V transformation through 3-phase isolation transformer. Motor less than 1kw can adopt single-phase AC 220V power supply (single phase power connected to R and T with S hung in the air.)

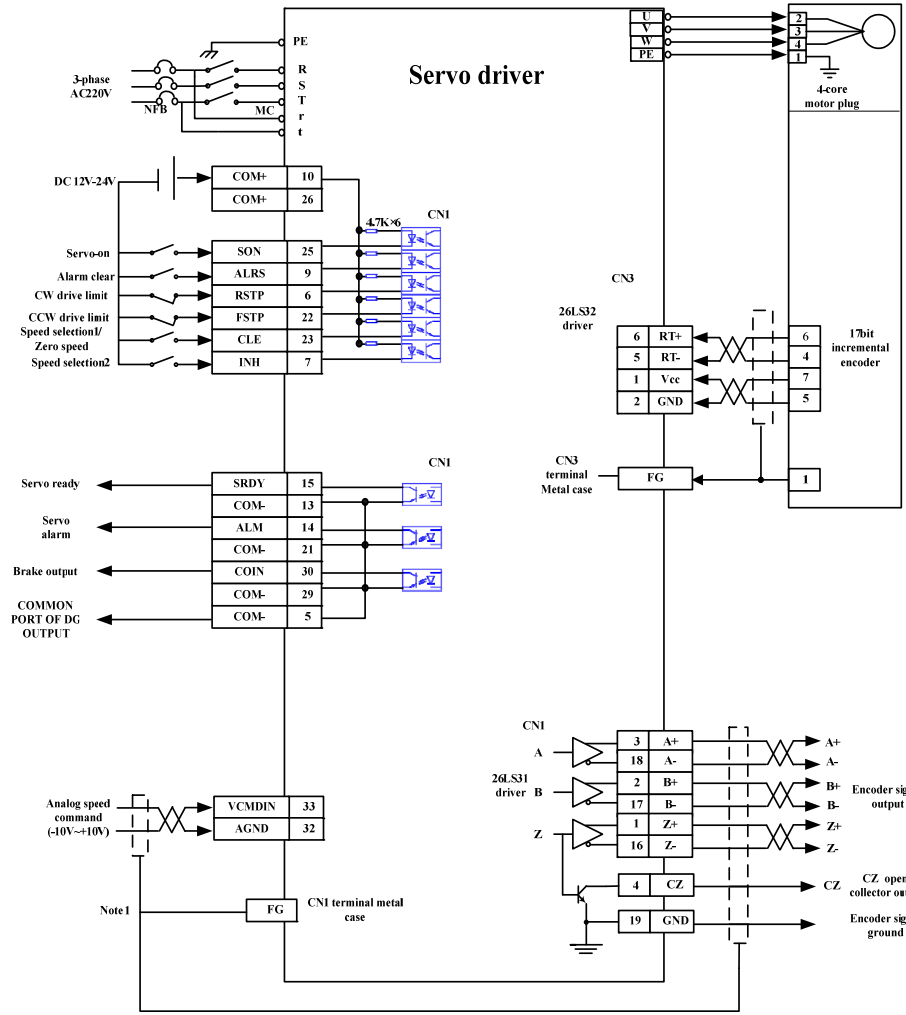


Figure 5-6 P Series Speed Control Wiring Diagram

Note 1: shielding line between CN1 wiring terminal and upper computer shall be grounded reliably at both ends.

5.2 Power Terminal

5.2.1 Power Terminal Connection

(1) Standards

Wire diameter: R, S, T, U, V, W and PE terminal diameters ≥1.5mm² (AWG14-16), r and terminal diameter ≥1.0mm² (AWG16-18)。

Use JUT-1.5-4 pre-insulated cold-pressed terminal which shall be connected firmly.

Grounding wire shall be thick and strong, and grounding terminal of servo motor shall be connected with grounding terminal of servo driver. Groundingresistance≤100Ω 。

It is suggested to adopt 3-phase isolation transformer to supply power so as to reduce the possibility of electric shock.

It is suggested to power motor with noise filter to reduce interruption.

Non fuse protect shall be installed to cut off external power supply in time when driver in fault.

(2) Note

Note

- ✧ U, V and W wiring shall be respectively corresponding to motor terminal U, V and W. Be cautious not exchanging 3-phase terminal to make motor to run reversely, which is completely different from stepping motor.
- ✧ For high-frequency switch current flows through servo motor, leakage current is relatively big. Motor grounding terminal shall be servo driver's grounding terminal PE and well grounded.
- ✧ For there are a large amount of electrolytic capacitance in servo driver, there will be high voltage in internal circuit even if power is cut off.
- ✧ Therefore, don't touch driver and motor at least within 5 minutes after power cut off.
- ✧ Operator shall keep certain distance from driver and motor when power connected.
- ✧ Please cut power off if not used for a long time.

(3) Notes on wire diameter requirements

✧ Servo driver has not big requirements on accuracy. Any place with power less then 0.8kW can take single-phase AC220V(+10%～－15%) power source. For wiring, refer to Table 5-1. Place with power more than 0.8kw shall use 3-phase AC220V (+10%～－15%) power.

Output power	R	S	T	PE	U	V	W	r	t
Type	Input terminal of main power supply			Protection Grounding	Power output terminal			Control power supply input	
0.2～1.0（kW）	1.5	1.5	1.5	≥2.0	1.5	1.5	1.5	1.0	1.0
1.0～2.5（kW）	2.0	2.0	2.0	≥2.0	2.0	2.0	2.0	1.0	1.0

Table 5-1 Wiring section Selection of Main Circuit.

✧ When connecting terminal, strip off insulated coat as required by standards and tighten naked copper wire. Groove wire by pre-insulated cold-pressed terminal and fix it firmly. The standards are as shown below:

Table 5-7 Grooving Standards

5.2.2 (Power Input/Output) Interface Definition of TB Power Terminal

Interface definition of TB power terminal is as shown in Table 5-2.

No.	Terminal code	Signal name	Function
1	R	Power input of main circuit single phase or 3-phase	Power input terminal of main circuit ～220V 50Hz Note: Do not connect with motor output terminal U, V or W.
2	S		
3	T		
4	PE	Grounding	Grounding terminal to connect with case ground of motor
5	U	Servo motor output	Output terminal of servo motor shall be connected respectively corresponding to motor terminal U, V and W.
6	V		
7	W		
8	P	External brake resistance	To absorb internal regenerated energy of driver when motor stops.
9	D		
10	r	Input of control power	Power input terminal of control circuit ～220V 50Hz
11	t		

Table 5-2 TB Interface Definition of Power Terminal

5.2.3 Connection Standards of Braking Terminal

- ✧ Generally speaking, terminal P and D shall be hung in the air without any external resistance. In case of Err-14 alarm for regenerated energy is too much due to speed reduction and internal resistance cannot absorb all the energy, deceleration time can be prolonged according to the circumstances. If the alarm still exists, external brake resistance shall be connected through terminal P and D to enhance brake effect.
- ✧ As for brake resistance, its value ranges from 40 to 200Ω while power 50～100W. The less the resistance value is, the more the brake current, the more brake resistance power needed, and the bigger brake energy. However, resistance with too small value may damage the driver. Therefore, the resistance shall be tested from big value to small one until the driver doesn't send any alarm. External brake resistance is parallel to internal brake resistance (about 40Ω), and operation can only be carried out 5 minutes after driver powered off and internal high voltage released completely.
- ✧ For terminal P and D are connected with internal high voltage circuit, do not touch them within 5minutes of power on and power off to avoid electric shock. Terminal P and D cannot get into touch with other terminals to avoid short circuit.

5.3 Interface Type

5.3.1 Switch Input Interface Type 1

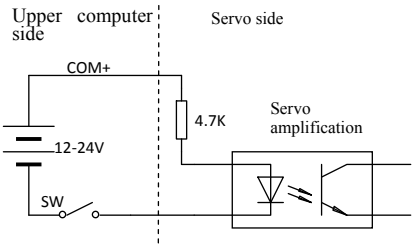


Figure 5-8 Type1: Schematic Diagram of Output Input Interface

- ✧ User provides power supply: DC12～24V; current≥100mA;

Note: If current polarity connected reversely, it may cause servo driver fails to work.

5.3.2 Switch Output Interface Type 2

Switch output interface includes two types: (1) Type 1: relay connection, and (2) Type 2: photocoupler connection. For their schematic diagrams, see Figure 5-9 and Figure 5-10.

- ✧ External power supply shall be provided by user, but be careful that it may damage servo driver if power polarity connected reversely.
- ✧ Output shall be open-collector type with the maximum current 50mA and the maximum voltage of external power 25V. Therefore, the load of output signal shall meet the limitation requirement. If exceeding limit or output directly connected to the power supply, it may damage servo driver.
- ✧ If it is inductive load such as relay, free-wheel diodes shall be reversely connected to the both ends of the load. If FWD connected reversely, it may damage servo driver.

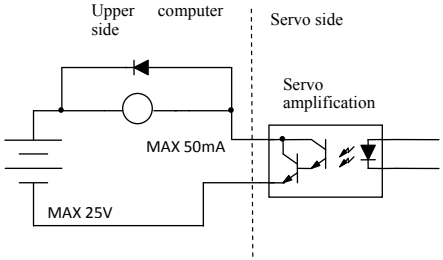


Figure 5-9 Type2 Output Interface Type 1: Relay

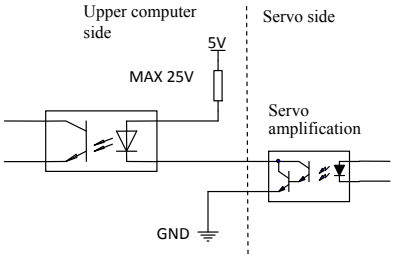


Figure 5-10 Type2 Output Interface Type 2: photocoupler

5.3.3 Pulse Input Interface Type 3

Pulse input interface consists of two drive modes, respectively differential drive mode and single-ended drive mode. Their schematic diagrams are as shown in Figure 5-11 and 5-12.

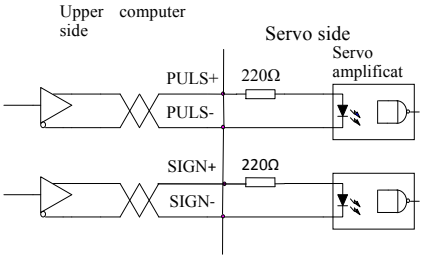


Figure 5-11 Differential Drive Mode

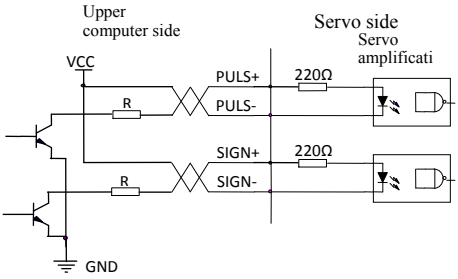


Figure 5-12 Single-ended Drive Mode

Comparisons of these two drive modes are as shown below:

- ✧ AM26LS31, MC3487 or similar RS422 linear driver shall be adopted for differential drive mode.
- ✧ Single-ended drive mode may decrease motion frequency. Resistance value of R shall be determined according to the conditions including pulse input circuit, drive current 10～15mA and the maxmum external power voltage limited to 25V. Empirical data: VCC=24V，R=2～3kΩ；VCC=12V，R=510～820Ω；VCC=5V，R=82～120Ω.
- ✧ If single-ended drive mode adopted, user shall provide external power supply, but be cautious that it may damage servo driver if power polarity connected reversely. For pulse input form, see the Chapter “Operation Sequence”. Arrow means counting edge. For more information, see pulse input sequence and parameters of the Chapter “Operation Sequence”. If 2-phase input form used, frequency of its 4-time frequency pulse ≤500kHZ.

To correctly transmit pulse data, it is suggested to adopt differential drive mode.

5.3.4 Analog Input Interface Type 4

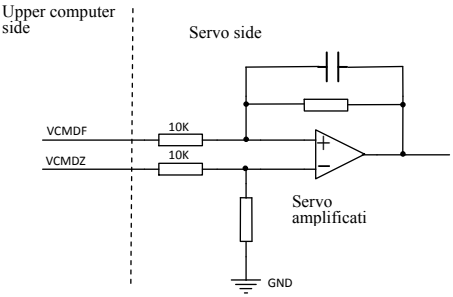


Figure 5-13 Type4: Interface Mode of Analog Input

5.3.5 Encoder Signal Differential Output Interface Type 5

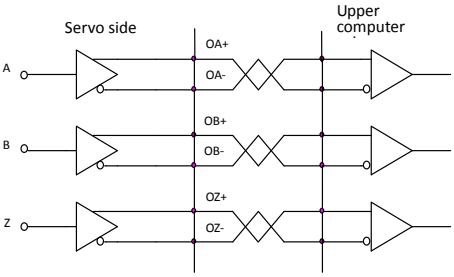


Figure 5-14 Type5：Output Interface of Optical Encoder

- ✧ Encoder signal is output through differential driver (AM26LS31)
- ✧ Control input terminal can adopt (AM26LS32) receiver but must be connected with terminal resistance about 330Ω.
- ✧ Grounding line of controller shall be reliably connected with grounding line of the driver.
- ✧ Non-isolated output.
- ✧ Control input terminal. Photocoupler can also adopted to receive signal, but must be high-speed photocoupler (e.g., 6N137).

5.3.6 Type 6 Encoder Z Signal Open-collector Output Interface

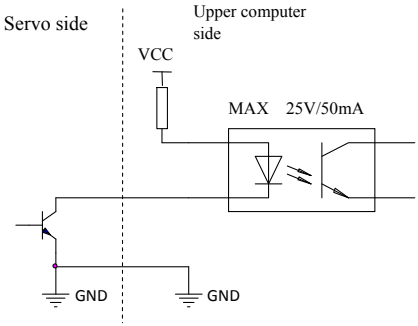


Figure 5-15 Output Interface of Optical Encoder

- ✧ Z signal of the encoder is output by open-collector. When Z signal appears, it outputs ON (output on), or else it outputs OFF (output off).
- ✧ Non-isolated output (non-insulated).
- ✧ Z-phase signal pulse is much narrow on upper computer generally, and so please use high-speed photocoupler to receive it (e.g., 6N137).

5.3.7 Servo Motor's Photoelectric Encoder Interface Type 7

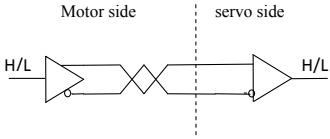


Figure 5-16 Input Interface of Photoelectric Encoder of Servo Motor

5.4 CN1/CN2/ CN3 Signal Terminal Connection Standards and Interface Definition

Connection standards:

- ✧ Input/output signal control line and encoder signal line shall be shielded line (shielded twisted pair cable is better) with cable diameter ≥0.12mm².
- ✧ Wire length: the shorter the cable is, the better. Input/output signal control line shall be les than 3m while encoder signal line shall be 20m or less.
- ✧ When mounting cables, signal line shall be away from power line and be at least 30cm away from wiring of main circuit. It shall not use pipe the same as main circuit or be bundled together with main circuit to avoid interruption. Cable between driver and motor shall be within 20m.
- ✧ Feedback cable of encoder shall be 30cm away from wiring of main circuit, and shall not be in the same pipe as wiring of main circuit or be bundled together.
- ✧ Feedback signal line shall be multiple-twisted line with insulation coating with sectional area 0.15mm^2 ～0.20mm^2. Insulation coating shall be connected with FG terminal.
- ✧ Cable and lead shall be fixed well, and away from servo unit radiator and motor to avoid insulation performance reduced for heat.

5.4.1 W Series

(1) Pin Definition

CN1 control signal terminal (connecting cable side) of EVTA W series servo driver is 44-pin male while CN2 terminal(cable side) is 26-pin male. For pin definition, see Figure 5-17 and 5-18.

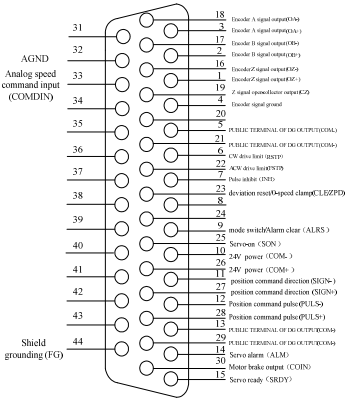


Figure 5-17 CN1 Terminal Wiring

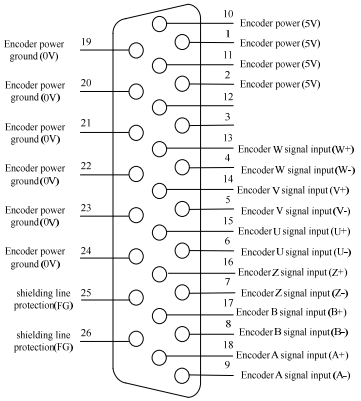


Figure 5-18 CN2 Terminal Wiring

(2) Interface Definition of W Series CN1 Terminal

Table 5-3 shows the interface definition of CN1 terminal (input/output signal).

Terminal No.	Signal name	Terminal sign		Function
		Sign	I/O	
6	CW drive inhibit	RSTP	Type1	CW (clockwise) drive inhibit input signal RSTP ON：CW drive permit RSTP OFF：CW drive inhibit Note 1: used for mechanical over limit. When switch is off, torque at CW direction is 0. Note 2: set parameter PA30=1 to shield the function. User can enable CW drive permit without connecting the signal.
7	command pulse inhibit	INH	Type1	Inhibit input signal of position command pulse INH ON：Command pulse inhibit input INH OFF：Command pulse input effective
9	Mode switch	ALRS	Type1	When PA4=9, speed/ position mode switch function effective.
	Alarm clear	ALRS	Type1	Alarm clear input signal ALRS ON： clear system alarm ALRS OFF：keep system alarm
14	Servo alarm output	ALM	Type2	Servo alarm output signal ALM ON: no servo driver alarm; servo alarm output ON (output ON) ALM OFF：servo driver alarm; servo alarm output OFF (output OFF)
15	Servo ready to output	SRDY	Type2	Servo ready output signal SRDY ON ：Control power and main power are normal; driver has no alarm and servo is ready to output ON (output ON) SRDY OFF：Main power is not connected or driver has alarm. Servo ready output is off (output OFF).
22	CCW drive inhibit	FSTP	Type1	CCW (counterclockwise) drive inhibit input signal FSTP ON： CCW drive permit FSTP OFF：CCW drive inhibit Note 1: used for mechanical overlimit. When switch is off, torque at CCW direction is 0. Note 2: set parameter PA30=1 to shield the function. User can enable CCW drive permit without connecting the signal.
30	Motor brake output	COIN	Type2	Brake output signal COIN O: L (lower level) to release motor brake. Brake output signal COIN OFF: H (high level) to release motor brake. Relative parameter setting（Unit：2ms）: P49： delay time from motor brake to serve OFF with normal setting as 100. P48：delay time from servo ON to motor brake command with normal setting as 100. P47：time to output motor brake command when motor rotating with normal setting as 500.
28	Command pulse PULS input	PULS+	Type3	Input signal of external command pulse
12		PULS-	Type3	
23	Deviation counting reset (Position control)	CLE	Type1	Position deviation counter reset input CLE ON： reset position deviation reset under position control
	Zero speed (speed control）	ZPD	Type1	ZEROSP D ON： force speed command to be 0 without regarding to analog input; ZEROSP D OFF：speed command is analog input value

Terminal No.	Signal name	Terminal sign		Function
		Sign	I/O	
27	Command pulse	SIGN+	Type3	input signal of external command direction
11	SIGN input	SIGN -	Type3	

Table 5-3 Interface Definition List of CN1 Terminal (Input/output Signal)

Table 5-4 shows the interface definition of CN1 terminal(feedback signal output of motor encoder).

Terminal No.	Signal name	Terminal sign		Function
		Sign	I/O	
3	Encoder A phase signal	OA+	Type5	1. ABZ signal differential drive output of encoder (26LS31 output corresponding to RS422) 2. Non-isolation output (not insulated)
18	Encoder A phase signal	OA-	Type5	
2	Encoder B phase signal	OB+	Type5	
17	Encoder B phase signal	OB-	Type5	
1	Encoder Z phase signal	OZ+	Type5	
16	Encoder Z phase signal	OZ-	Type5	
4	Z signal open-collector output	CZ	Type6	Z signal open-collector output
19	Public ground line of encoder	GND		Public ground line of encoder
Case	Shielding grounding line	FG		Terminal of shielding grounding line

Table 5-4 Interface Definition of CN1 Terminal (Feedback Signal Output of Motor Encoder）

(3) Interface Definition of W Series CN2 Terminal

Table 5-5 shows the pin definition of CN2 terminal (encoder signal input).

Terminal No.	Signal name	Function		
		Sign	I/O	Description
1, 2, 10, 11	5V power	+5V		Optical encoder of servo motor uses＋5V power supply and public ground; if cable is long, several-core line shall be connected in parallel to reduce line voltage drop.
19～24	Public power ground	0V		
18	Encoder A+ input	A+	Type7	Connect to optical encoder A+
9	Encoder A- input	A-		Connect to optical encoder A-
17	Encoder B+ input	B+	Type7	Connect to optical encoder B+
8	Encoder B- input	B-		Connect to optical encoder B-
16	Encoder Z+ input	Z+	Type7	Connect to optical encoder Z+
7	Encoder Z- input	Z-		Connect to optical encoder Z-
15	Encoder U+ input	U+	Type7	Connect to optical encoder U+
6	Encoder U- input	U-		Connect to optical encoder U-
14	Encoder V+ input	V+	Type7	Connect to optical encoder V+
5	Encoder V- input	V-		Connect to optical encoder V-
13	Encoder W+ input	W+	Type7	Connect to optical encoder W+
4	Encoder W- input	W-		Connect to optical encoder W-
25、26	Shielding ground wire	FG		Shielding ground wire terminal

Table 5-5 Interface Definition of CN2 Terminal (Encoder Signal Input)

5.4.2 F Series

(1) Pin Definition

CN1 control signal terminal (connecting cable side) of EVTA F Series Servo driver is the 25-pin male while CN2 terminal (cable side) is 15-pin male. For pin definition, see Figure 5-19 and 5-20.

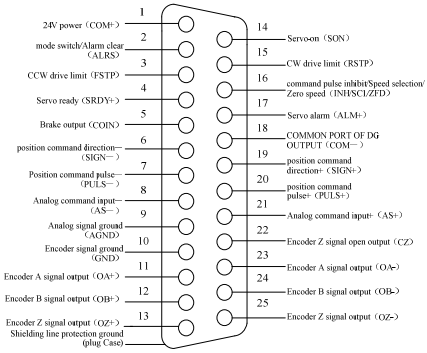


Figure 5-19 CN1 Terminal Wiring

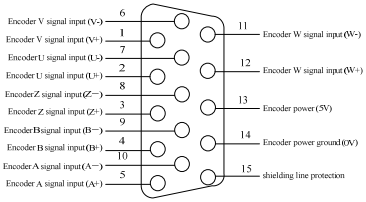


Figure 5-20 CN2 Terminal Wiring

(2) Interface Definition of F Series CN1 Terminal

Table 5-6 shows the interface definition of CN1 terminal (input/output signal).

Terminal No.	Signal name	Terminal sign		Function
		Sign	I/O	
2	mode switch	ALRS	Type1	When PA4=9, speed/position mode switch function effective
	Alarm clear	ALRS	Type1	Alarm clear input signal ALRS ON： clear system alarm ALRS OFF：keep system alarm
3	CCW Drive limit	FSTP	Type1	CCW (counterclockwise) drive limit input signal FSTP ON ：CCW drive permit FSTP OFF：CCW drive inhibit Note 1: used for mechanical overlimit. When switch is off, torque at CCW direction is 0. Note 2: set parameter PA30=1 to shield the function. User can enable CCW drive permit without connecting the signal.
4	Servo ready to output	SRDY +	Type2	Servo ready output signal SRDY ON ：Control power and main power are normal; driver has no alarm and servo is ready to output ON (output ON) SRDY OFF：Main power is not connected or driver has alarm. Servo ready output is off (output OFF).
5	Brake output	COIN	Type2	Brake output signal COIN O: L (lower level) to release motor brake. Brake output signal COIN OFF: H (high level) to release motor brake. Relative parameter setting（Unit：2ms）: P49： delay time from motor brake to serve OFF with normal setting as 100. P48：delay time from servo ON to motor brake command with normal setting as 100. P47：time to output motor brake command when motor rotating with normal setting as 500.

Terminal No.	Signal name	Terminal sign		Function
		Sign	I/O	
16	command pulse inhibit	INH	Type1	Input inhibit signal of position command pulse INH ON：Command pulse input inhibit INH OFF：Command pulse input effective
	Speed selection1	SC1	Type1	Parameter for speed control mode (PA4=1). To select internal speed, speed selection input terminall can select different internal speed under control mode. SC1 OFF：internal speed 1； SC1 ON ：internal speed 2； Note: internal speed 1-2 can be changed by parameter.。
	Zero speed (Speed control)	ZFD	Type1	ZEROSP D ON： force speed command to be 0 without regarding to analog input; ZEROSP D OFF：speed command is analog input value
15	CW Drive limit	RSTP	Type1	CW (clockwise) drive limit input signal RSTP ON ：CW drive permit RSTP OFF：CW drive inhibit Note 1: used for mechanical overlimit. When switch is off, torque at CCW direction is 0. Note 2: set parameter PA30=1 to shield the function. User can enable CCW drive permit without connecting the signal.
17	Servo alarm output	ALM+	Type2	Servo alarm output signal ALM ON: no servo driver alarm; servo alarm output ON (output ON) ALM OFF：servo driver alarm; servo alarm output OFF (output OFF)
14	Servo-on	SON	Type1	Servo-on input terminal SON ON：allow driver to work SON OFF: driver is off and stops working, while motor is in free state. Note 1: before turning SON ON to SON OFF, motor shall be inhibited. Note 2: no command shall be entered within at least 50ms after turning to SON ON.
21	Analog command input	AS+	Type3	Input signal of analog command direction
8		AS-	Type3	
19	position command direction	SIGN+	Type3	Input signal of external command direction
6		SIGN -	Type3	
20	position command pulse	PULS+	Type3	Input signal of external command pulse
7		PULS-	Type3	

Table 5-6 Interface Definition List of CN1 Terminal Input/output Signal)

Table 5-7 shows that interface definition of CN1 terminal (feedback signal output of motor encoder).

Terminal No.	Signal name	Terminal sign		Function
		Sign	I/O	
11	Encoder A phase signal	OA+	Type5	ABZ signal differential drive output of encoder (26LS31 output corresponding to RS422) 2. Non-isolation output (not insulated)
23		OA-	Type5	
12	Encoder B phase signal	OB+	Type5	
24		OB-	Type5	
13	Encoder Z phase signal	OZ+	Type5	
25		OZ-	Type5	
22	Z signal open-collector output	CZ	Type6	Z signal open-collector output

Terminal No.	Signal name	Terminal sign		Function
		Sign	I/O	
10	Public ground line of encoder	GND		Public ground line of encoder
Case	shielding line protection ground	FG		Shielding grounding line terminal

Table 5-7 Interface Definition of CN1 Terminal (Feedback Signal Output of Motor Encoder)

(3) Interface Definition of F Series CN2 Terminal

Table 5-8 shows the interface definition of CN2 terminal (encoder signal input).

Terminal No.	Signal name	Function		
		Sign	I/O	Description
13	encoder power	+5V		Optical encoder of servo motor uses＋5V power supply and public ground; if cable is o long, several-core line shall be connected in parallel to reduce line voltage drop.
14	encoder power grounding	0V		
5	encoder A+ input	A+	Type7	Connect to optical encoder A+
10	encoder A- input	A -		Connect to optical encoder A-
4	encoder B+ input	B+	Type7	Connect to optical encoder B+
9	encoder B- input	B-		Connect to optical encoder B-
3	encoder Z+ input	Z+	Type7	Connect to optical encoder Z+
8	encoder Z- input	Z-		Connect to optical encoder Z-
2	encoder U+ input	U+	Type7	Connect to optical encoder U+
7	encoder U- input	U -		Connect to optical encoder U-
1	encoder V+ input	V+	Type7	Connect to optical encoder V+
6	encoder V- input	V-		Connect to optical encoder V-
12	encoder W+ input	W+	Type7	Connect to encoder W +
11	encoder W- input	W -		Connect to encoder W -
15	Shielding grounding line protection	FG		Shielding grounding line terminal

Table 5-8 Interface Definition of CN2 Terminal (Encoder Signal Input)

5.4.3 P Series

(1) Pin Definition

CN1 control signal terminal (connecting cable side) of EVTA P series servo driver is the 44-pin male while CN3 terminal (cable side) is 6-pin male. For pin definition, see Figure 5-21 and 5-22.

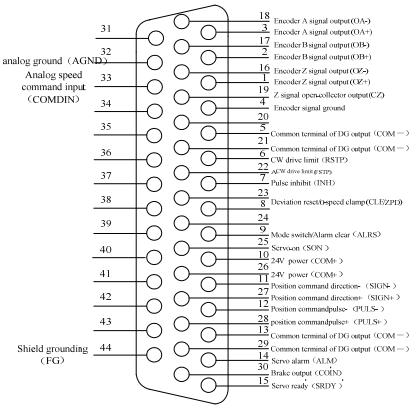


Figure 5-21 CN2 Terminal Wiring

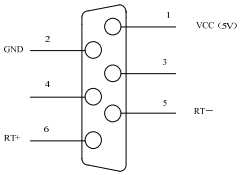


Figure 5-22 CN3 Terminal Wiring

(2) Interface Definition of P Series CN1 Terminal

Interface definition of P series CN1 terminal is the same as that of W series CN1 terminal as shown in Table 5-3 and 5-4.

(3) Interface Definition of P Series CN3 Terminal

Table 5-5 shows that interface definition of CN3 terminal (encoder signal input).

Terminal No.	Signal name	Function		
		Sign	I/O	Description
1	5V power	+5V		Optical encoder of servo motor uses＋5V power supply and public ground; if cable is o long, several-core line shall be connected in parallel to reduce line voltage drop.
2	GND	0V		
5	RS485-	RT-		Signal interface of bus encoder
6	RS485+	RT+		

Table 5-9 Interface Definition of CN 3 Terminal (Encoder Signal Input)

5.5 Pulse Input Form

Pulse command input forms consists of 3 types including: 1) pulse + sign, 2) double pulse 9CCW pulse + CW pulse) and 3) 2-phase command pulse.

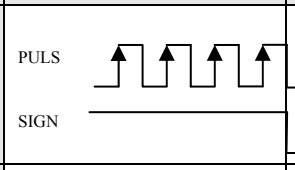
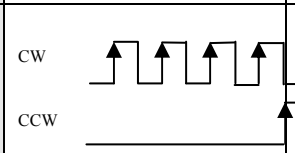
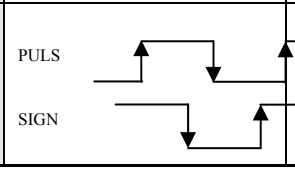
Pulse command form	CCW	CW	Set parameter
pulse train sign			0 Command pulse＋ sign
CCW pulse train CW pulse train			1 CCW pulse/CW pulse
A-phase pulse train B -phase pulse train			2 2-phase Command pulse

Table5-6 Pulse Input Form

5.6 Pulse Input Sequence

5.6.1 Time Parameter

Parameter	Differential drive input	Single-ended drive input
t_{ck}	>2μS	>5μS
t_h	>1μS	>2.5μS
t_l	>1μS	>2.5μS
t_{rh}	<0.2μS	<0.3μS
t_{rl}	<0.2μS	<0.3μS
t_s	>1μS	>2.5μS
t_{qck}	>8μS	>10μS
t_{qh}	>4μS	>5μS
tql	>4μS	>5μS
tqrh	<0.2μS	<0.3μS
tqrl	<0.2μS	<0.3μS

Table 5-7 Time Parameter List

5.6.2 Sequence Charts of Three Pulse Input Forms

(1) Pattern 1: pulse frequency chart for pulse ＋sign input interface (the max.

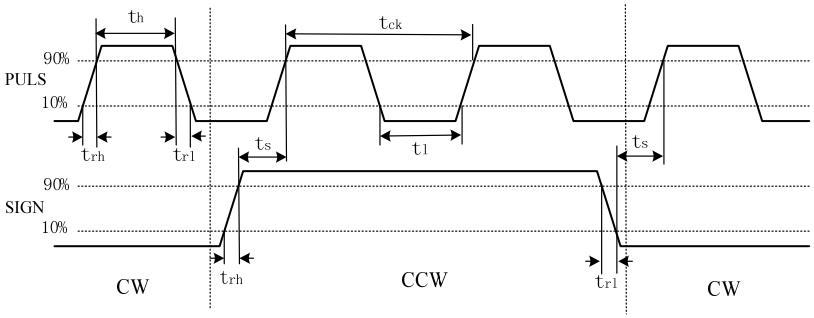


Figure 5-23 Sequence Chart for Pulse＋Sign Interface Input

(2) Pattern 2: sequence chart fro CCW pulse/CW pulse input interface

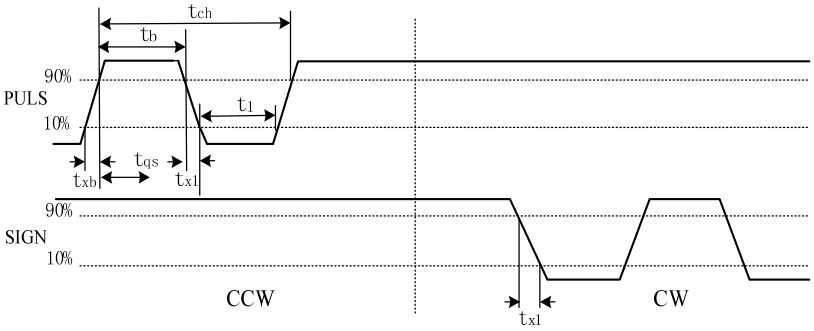


Figure 5-24 Pattern 2: Sequence Chart for CCW pulse/CW pulse Input
(the max. pulse frequency: 500kHz)

(3) Pattern 3: Sequence Chart for 2-phase Command Pulse Input

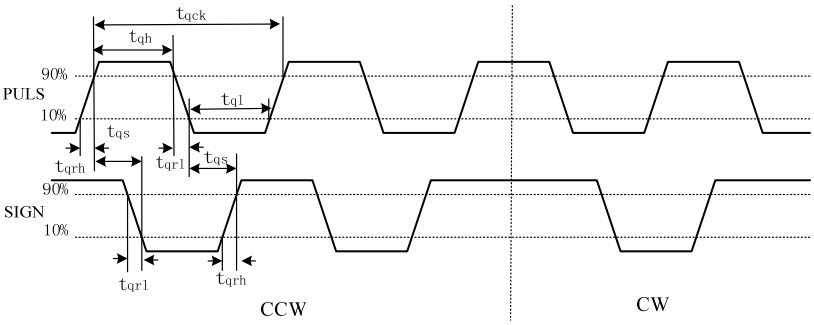


Figure 5-25 Pattern 3：Sequence Chart for 2-phase Command pulse Input
(the max. pulse frequency: 500kHz)

5.6.3 Motor Encoder Output Feedback

When motor rotates CCW, A and B phase inputs of motor encoder signal are as follows:

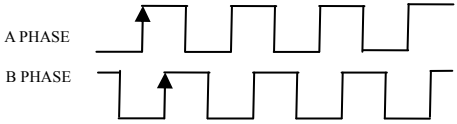


Figure 5-26 Pulse Input in Standard Setting

When motor rotates CW, A and B phase inputs of motor encoder signal are as follows:

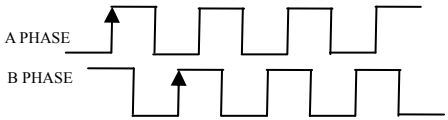


Figure 5-27 Pulse Input in Reversing Mode

Chapter 6 Digital Operator (W Series)

6.1 Operation and Display Interface

Display interface is provided for user to adjust parameters and monitor driver status.

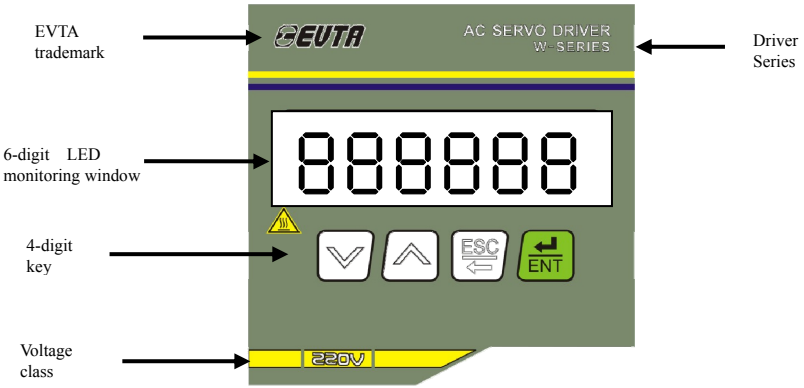


Figure6-1 Display Interface

6.2 Key name and Function

Display panel consists of 6 LED displays and 4 keys , , , to display various statuses and set parameters of the display. Key functions are as shown below:

No.	Function
	No. and numerical value decrease or the option returns to the previous one
	No. and numerical value increase or the option returns to the next one
ESC	Return to the previous level of operation menu or cancel operation
ENT	Enter the next operation menu or confirm the input.

Table 6-1 Key Function

Among it, and keys shall be kept pressed with operation repeated. The longer the key pressed, the quicker the repeation. For various statuses and data of the 6-digit LED display system, when changing parameters, decimal point lights at lower right corner of the 6-digit display tube will turn on. If the light turns off when pressing , it indicates the value confirmation enters into effect. If pressing to exit when the light is on, parameter setting is invalid. When Err flashes, it indicates driver sends alarm.

6.3 Operation Mode of Main Menu

Main menu (namely the first class menu) consists of the following functions: status monitoring, parameter setting, parameter management and auto running. The main menu is selected and operated as shown below:

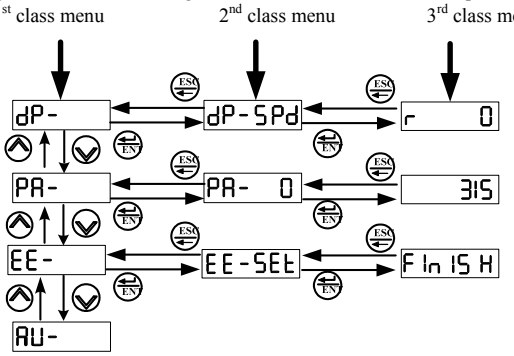


Figure6-2 Operation Mode of Main Menu

6.4 Monitoring Status

6.4.1 Framework Corresponding to Monitoring Status Frame

Select dP- at the main menu (namely the 1st class menu) and press ENT key to enter monitoring mode. There are 22 display statuses and user can select different statuses by ▼ and ▲ keys in the menu. In addition, user can also set the initial monitoring status when driver powered on by setting parameter PA03.

Value	Initial monitoring	Operation	Example	Description
PA3=0	dP-SPd		r 1000	motor speed1000 r/min (1)
PA3=1	dP-PoS		P 5806	4 low digits of the current motor position (pulse) (2)
PA3=2	dP-PoS.		P. 18	4 high digits of the current motor position (*10000)
PA3=3	dP-CPo		C 5810	4 low digits of position command（pulse） (2)
PA3=4	dP-CPo.		C. 18	4 high digits of position command (*10000)
PA3=5	dP-EPo		E 213	4 low digits of position deviation (pulse) (2)
PA3=6	dP-EPo.		E. 0	4 high digits of position deviation (*10000 pulse)
PA3=7	dP-tr9	ENT	t 18	motor torque: 18%
PA3=8	dP-I	→	I 2.3	motor current: 2.3A (3)
PA3=9	dP-LSP		L20.000	Standby
PA3=10	dP-Cnt	ESC	0	the current control mode: position mode (4)
PA3=11	dP-Fr9	←	F 124	Standby
PA3=12	dP-CS		r. 10	Speed command: 10 r/min
PA3=13	dP-Ct		t 2	Torque command
PA3=14	dP-APo		1-3256	Standby

PA3=15	dP-In		In'''''11	Input terminal status
PA3=16	dP-oUt		OUt'''''	Standby
PA3=17	dP-Cod		-150	Standby
PA3=18	dP-rn		rn- on	In running (5)
PA3=19	dP-Err		Err- 9	Display No. 9 alarm (6)
PA3=20	dP- SF		C 100	Software version no.

Table 6-2 Monitoring Status

4.2 Monitoring Status Description

(1) r 1000: r: motor sped code; 1000 : CCW 1000r/min of motor. If it rotates CW, it displays negative speed - 1000. Unit : r/min.

(2) The feedback position of motor encoder consists of POS．(4 high digits)＋POS (4 low digits).

Ex.：P. 18 × 10000 ＋ P 5806 ＝185806 pulses. Similarly, position command pulse consists of CPO．(4 high digits)＋CPO (4 low digits).

Ex.：C. 18 × 10000 ＋ C 5810 ＝185810 pulses

The relationship between CPO and POS is as shown below:

P. 0000 x10000 + P 0000 = PA12/PA15 (C. 0000 x10000 + C 0000)

In the same way, position deviation consists of EPO．(4 high digits)＋EPO (4 high digits). E.g,:

E. 0 × 10000 ＋ E 4 =4 pulses

Note: if motor rotates for 1 turns, POS display change=encoder line number×4 pulses.

(3) Formula for motor current $I = \sqrt{\frac{2}{3}(I_U^2 + I_V^2 + I_W^2)}$

(4) Control Mode：0-position control mode；1-speed control mode；3-test run control mode；4-zero test mode ； 5-measuring mode of motor load inertia；9-position and speed switching mode.

(5) Position command pulse frequency is the actual pulse frequency before amplification by entering Electronic gear. The unit in the last place: 0.1kHz. Positive display is shown as positive number while negative display is shown as negative number.

(6) When encoder is fixed, Z pulse is taken as zero pulse position. dP-APo Displays pulse value that position signal output by motor encoder deviates from the zero pulse.

If encoder line number is 2500, 1 turn is a cycle. The display range of dP-APo is 0～9999. Position corresponding to the display value is the accurate position of rotor in 1 rotation, namely the position of rotor relative to stator in 1 rotation.

(7) For input/output terminal status, see Chapter 4-5.

(8) Running status display:

rn- on: Main circuit of servo unit is powered on and enabled.

rn-oFF: Main circuit of servo unit is not powered on.

rn- CH: Main circuit of servo unit is powered on but not enabled.

Operation method to call out status monitoring mode:

To call out the dP-APo status monitoring display, two methods can be followed:

① Directly select status monitoring:

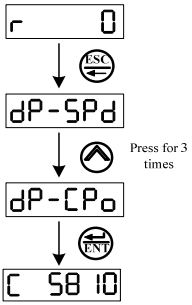


Figure 6-3 Selecting Status Monitoring

② Select status monitoring by parameters

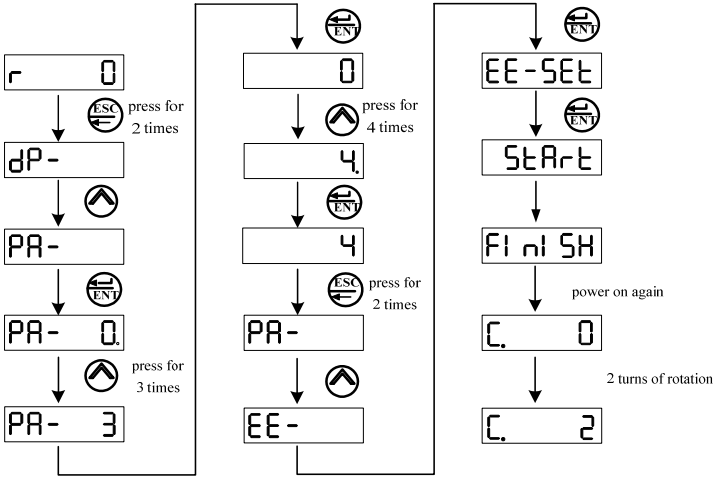


Figure 6-4 Select Status Monitoring by Parameters

(9) Alarm status display: if displaying " Err --", it indicates normal without alarm.

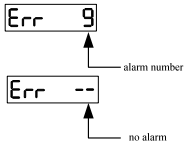


Figure 6-5 Alarm Status Display

Chapter 7 Parameters and Setting

The chapter mainly introduces application methods of various functions relevant to driver parameter adjustment and matters need attentions. User can read them as you need.

7.1 List of Parameter Code

Factory defaults in the following table are those for drivers of applicable motor.

No.	Name	Applicable mode	Parameter range	Factory default	Unit	Remark
0	Password	P，S	0~9999	315		
1	Model code	P，S	0~100			Parameter PA0 shall be changed to 310 upon change.
2	Internal system parameter					Reserve
3	Initial display status	P，S	0~21	0		
4	Control mode selection	P，S	0~9	0		Parameter PA0 shall be changed to 310 upon change.
5	Speed percentage gain	P，S	5~300	40		
6	Speed integral time constant	P，S	1~300	20		
7	Lowpass filter of current command	P，S	20~500	256		
8	Lowpass filter of speed inspection	P，S	20~500	64		
9	Position percentage gain	P	1~200	40	1/S	
10	Position feed forward gain	P	0~80	0		
11	Cutoff frequency of feed forward lowpass filter	P	1~500	100		
12	Division numerator of position command pulse	P	1~32767	1		
13	Division denominator of position command pulse	P	1~32767	1		
14	position command pulse Input mode	P	0~3	0		
15	Reverse direction of position command pulse	P	0~1	0		
16	Positioning completion range	P	0~30000	8	pulse	
17	Inspection range of too poor position	P	0~30000	200	pulse	
18	Invalid mistake of too poor position	P	0~1	0		
19	position command smoothing filter	P	1~500	100		
20	Invalid drive inhibit input	P，S	0~1	0		
21	JOG running speed	S	-3000~3000	200	r/min	
22	Internal/external speed command selection	S	0~1	0		
23	The max. speed limit	P，S	0~4000	3150	r/min	
24	Internal speed1	S	-3000~3000	0	r/min	
25	Internal speed2	S	-3000~3000	100	r/min	
26	Internal speed3	S	-3000~3000	300	r/min	
27	Internal speed4	S	-3000~3000	-300	r/min	
28	Arriving speed	S	0~3000	10	r/min	
29	Lowpass filter of speed command	P，S	0~500	100		If set to be 0, the function will be

No.	Name	Applicable mode	Parameter range	Factory default	Unit	Remark
						shielded.
30	Internal system parameter					Reserve
31	Rigid compensation	P , S	0~100	0		
32	Speed estimation	P , S	0~1	0		
33	Motor load inertia setting	P，S	0~1500	100		※
34	Internal CCW torque limit	P，S	0~300	200	%	
35	Internal CW torque limit	P，S	-300~0	-200	%	
38	Standby		5-300			
39	Standby		0-300			
40	Deceleration time constant	S	1~2000	100	10ms	
41	Acceleration time constant	S	1~2000	100	10ms	
43	Analog speed command gain	S	10~3000	200	r/min/V	
44	Reverse direction of analog speed command	S	0~1	0		
45	0-deviation compensation of analog speed command	S	-3000~3000	0		
46	Lowpass filter of analog speed command	S	0~1000	100	Hz	
47	Brake time constant 1	P，S	0~1000	0	2ms	
48	Brake time constant 2	P，S	0~1000	0	2ms	
49	Brake time constant 3	P，S	0~1000	0	2ms	
50	Electronic gear of encoder output	P，S	0~9999	0		If 0, it outputs 10000 pulses.
52	Special application	P	0~1	0		If it is 1, direction signal is taken as enabling signal of driver
53	Mandatory enabling setting	P	0000~0001	0000		If the first digit at right set to be 1, mandatory enabling function can be triggered.
56	Multipurpose pin selection	P，S	0~1	0		
57	Reverse servo ready and alarm	P，S	00~11	00		
54~55	Internal system parameter					Reserve
58~77	Internal system parameter					Reserve

Table 7-1 List of Parameter Code

7.2 List of Parameter Function

No.	Name	Function	Parameter range
0	Password	①Used to prevent parameter from wrong change. To set the parameter, first set the parameter to the required one and then set the parameter. After commissioning, set the parameter to be 0 to ensure it will not be wrong changed.	0~9999
		②Passwords are graded to corresponding to user parameters and all parameters	
		③To change model code parameter (PA1), model code password shall be used for other passwords cannot change the parameter.	
		④ User password: 315	
		⑤ Password for model code: 310	
1	Model	① Corresponding to different drivers and motor under the same series.	0~51
		②Different model codes have different default parameter values. To use the function of resetting default parameter, do ensure the parameter is correct.	
		③ In case of EEP ROM alarm (No. 20), the parameter shall be reset after repair and then restore default parameter, or else it may cause driver abnormal or damaged;	
		④ To change the parameter, first set password parameter PA0 as 310, and then change the parameter.	
		⑤ For detailed parameter meaning, see the chapter.	
2	Reserve	Internal system parameter, reserved for use	reserve
3	Initial display status	Select display status when driver powered on	0~20
		0：display motor speed;	
		1：display the 4 low positions at current;	
		2：display the 4 high positions at current;	
		3：display the 4 low position commands (command pulse accumulation)	
		4：display the 4 low position commands (command pulse accumulation)	
		5：display the 4 low digit s of position deviation;	
		6：display the 4 high digit s of position deviation;	
		7：display motor torque;	
		8：display motor current;	
		9：display linear speed;	
		10：displayControl Mode；	
		11：reserve	
		12：display speed command;	
		19：display alarm code；	
		20：display software version no.	
4	Control mode selection	By the parameter, the following diver control modes can be set：	When changing among 0~5, parameter PA0 shall be changed to be 310
		0：Position control mode；	
		1：Speed control mode；	
		3： Control mode of test run；	
		4：Zero test mode of motor；	
		5：Measurement way of motor load inertia;	
		9：Position and speed switch mode;	
		Note 1: position control mode; position command is input from command pulse input interface Note 2: speed control mode; speed command is input through input terminal or by analog input (-10V— +10V), which depends on the parameter (internal/external speed command selection) (PA22). If internal speed, SC1	

No.	Name	Function	Parameter range
		and SC2 can be combined to select different internal speeds.	
5	Speed percentage gain	① To set percentage gain of speed ring regulator ②The bigger the set value, the higher the gain and the stronger the rigidness. Parameter value depends on the practical servo driver model and load. In general, the bigger the load inertia is, the bigger the set value is. ③In the condition of the system without any vibration, it shall be as big as possible.	5~300Hz
6	Speed product constant	①To set integral gain of speed ring regulator ②Parameter value depends on the practical servo driver model and load. In general, the bigger the load inertia is, the bigger the set value is. ③In the condition of the system without any vibration, it shall be as small as possible.	1~300
7	Lowpass filter of current command	①To set the filter feature of torque command to resonance generated by the torque (sharp vibration noise from motor) ② If sharp vibration noise from motor, please reduce the parameter. ③ The smaller the value, the lower the cutoff frequency and the smaller the motor noise. If load inertia is big, set value can be reduced properly. But if the value is too small, it may slow down response and cause unstableness.	20~500
8	Lowpass filter of speed inspection	①To set lowpass filter fracture of speed inspection ②The smaller the value, the lower the cutoff frequency and the smaller the motor noise. If load inertia is big, set value can be reduced properly. But if the value is too small, it may slow down response and cause vibration. ③The bigger the value, the higher the cutoff frequency and the quicker the speed response. If higher speed response value needed, set value can be increased properly.	20~500
9	Position percentage gain	① To set the percentage gain of position ring regulator ② The bigger the set value, the bigger the gain and the stronger the rigidness. Under the same command pulse condition, the position delay will be smaller. However, too large value may cause vibration or overshooting. ③Parameter value depends on the practical servo driver model and load.	1~200 1/s
10	Position feedforward gain	① To set feedforward gain of position ring ② If set to be 80%, it means that position delay will always be 0 no matter what frequency of command pulse. ③It may increase the feedforward gain of position ring and improve the high-speed response of the control system, but it will also make the system unstable and be easily cause vibration. ④Except much high response needed, feedforward gain of position ring shall be 0 normally	0~80
11	Lowpass filter gain of position feedforward	①To set lowpass filter's cutoff frequency of feedforward of position ring ②The filter is used to increase the stability of the combined position control. ③The smaller the value, the lower the cutoff frequency, and vise versa.	1~500
12	Division numerator of position command pulse	①To set the division frequency of position command pulse (electronic gear) ② In position control mode, it is easy to match with various pulse sources by setting parameter PA12 and P A13 to reach ideal control resolution (namely angle/pulse) as user required.	1~32767
		③ P ×G＝N×C×4 P：pulse number of input command; G：electronic gear, G＝division frequency/division frequency N：rotation turns of motor; C：photoelectric encoder line number/rotation, the system C＝500.	
		④〖Example〗 If command pulse is 6000, 1 rotation of servo motor G＝（N×C×4）/P ＝（1×2500×4 ）/6000 ＝5/3, the parameter PA12 is set as 5 and PA13 set as 3.	
13	position command	See parameter PA12	1~32767

No.	Name	Function	Parameter range
	pulse		
14	position command pulse input mode	To set input form of position command pulse. Set parameter to be one of the 4 input modes: 0：pulse ＋sign； 1：CCW pulse/CW pulse; 2：2-phase quadrature pulse input；3：2-phase quadrature pulse ＋（pulse ＋sign） Note 1：CCW means to axial observation of servo motor that rotates counterclockwise but is defined CW. Note 2: CCW means to axial observation of servo motor that rotates clockwise but is defined CCW. Note 3: pulse + sign at PA14=3 means repeated use of torque limit FSTP and RSTP.	0~3
15	position command pulse direction	0：normal; 1：reverse direction of position command pulse	0~1
16	Completion range of positioning	① To set lower positioning completion pulse range of position control ② The parameter provides the basis to judge driver is positioned in position control mode. When the remaining pulses in position deviation counter are less than or equal to the set value of the parameter, driver will consider positioning is complete and positioning completion signal COIN is ON, or else COIN OFF. ③ In position control mode, output positioning completion signal COIN; in other control modes, output speed reaches signal SCMP.	0~30000 pulse
17	Inspection range of too poor position	①To set inspection range of too poor position alarm ② In position control mode, when the counting value of too poor position counter exceeds the parameter, servo driver will send too poor position alarm	0~300 *100 pulse
18	Invalid fault of too poor position	0：Too poor position alarm is tested to be valid. 1：Too poor position alarm is tested to be invalid and the test stops.	0~1
19	Smoothing filter of position command	① To set lowpass filter of speed test. The smaller the value, the higher the cutoff frequency and the quicker the response; vise versa. ②Filter will not lose input pulse, but command may delay. ③ The filter is used for: a. Upper controller free from acceleration/deceleration function; b. Big electronic gear division frequency（>10）; c. Much low command frequency; d. Step jumping and unstable phenomenon will occur when motor is running.	1~32767
20	Ineffective drive inhibit input	The settings are: 0：CCW and CW input inhibit is valid. When CCW drive inhibit switch (FSTP) is ON, CCW drive permits; when CCW drive inhibit switch (FSTP) is OFF, CCW torque keeps at 0. It is the same as CW direction. If CCW and CW drive inhibits are OFF, it may cause wrong alarm of drive inhibit input. 1：Cancel CCW and CW input inhibit operation. No matter what switch condition of CCW and CW drive inhibit is, CCW and CW drives will permit. Meanwhile, if CCW and CW drives are OFF, no wrong alarm of drive inhibit will occur.	0~1
21	JOG running speed	To set the running speed for JOG operation	-3000 ~3000 r/min
22	Internal/external speed command selection	① When set to be 0, speed command is from internal speed； ② When set to be 1, speed command is from external analog input;	-3000 ~3000 r/min
23	The maximum speed limit	① To set the maximum speed of servo motor ②Non-relevant to rotary direction ③ If setting exceed the rated speed, the practical max. limit is the rated	-3000 ~3000 r/min

No.	Name	Function	Parameter range
		speed。	
24	Internal speed 1	①To set internal speed 1 ② In control mode, when SC1 OFF and SC2 OFF, internal speed 1 shall be selected as speed command.	-3000 ~3000 r/min
25	Internal speed 2	①To set internal speed 2 ②In control mode, when SC1 ON and SC2 OFF, internal speed 2 shall be selected as speed command.	-3000 ~3000 r/min
26	Internal speed 3	①To set internal speed 3 ②In control mode, when SC1 OFF and SC2 ON, internal speed 3 shall be selected as speed command.	-3000 ~3000 r/min
27	Internal speed 4	① To set internal speed 4 ②In control mode, when SC1 ON and SC2 ON, internal speed 4 shall be selected as speed command.	3000 ~3000 r/min
28	Arriving speed	① To set arriving speed ②In non-position control mode, if motor speed exceeds the set value, SCMP is ON, or else SCMP is OFF. ③ In position control mode, the parameter isn't used. ④ Non-relevant to rotary direction ⑤ Comparison tools are of delay feature.	-3000 ~3000 r/min
29	Lowpass filter of speed command	① To set lowpass filter of speed command. ②The smaller the value, the lower the cutoff frequency is. If value is too small, it may slow down response or cause vibration. ③If set to be 0, filtering function will be shielded.	0~500
30	Internal system parameter	Internal system parameter，reserved for use	reserve
31	Rigid compensation	Parameter setting may properly increase rigid response. If the value set to be 100, time to reach the position can be shortened by 20%。	0
32	Speed estimation	If set to be 1, it will be of speed estimation function under which speed inspection response improves and speed ring control gain increases under the same speed inspection noise, but the premise is that motor and load inertia are set correctly.	0
33	Motor load inertia setting	Method to set motor load inertia: after selecting through mode 5, servo system will automatically test values and set test value. The set value is only valid before power off of the operation. If power off, the value will restore to be the previous set value. To save to set value, parameter shall be saved again and it will be effective when restarted after power off.	0~1500
34	Internal CCW Torque limit	①To set internal torque limit value at CCW direction of servo motor. ②If the setting exceeds the maximum overload capacity of the system, the practical torque is the maximum allowable overload capacity of the system. ③At any time, the limit is effective ④If the setting exceeds the maximum overload capacity of the system, the practical torque is the maximum allowable overload capacity of the system.	0~300%
35	Internal CW torque limit	①To set internal torque limit value at CW direction of servo motor. ②The set value is the percentage of the rated torque. For example, if set to be 2 times of the rated torque, the set value is -200. ③At any time, the limit is effective. ④If the setting exceeds the maximum overload capacity of the system, the practical torque is the maximum allowable overload capacity of the system.	-300 ~0%
38	Standby		5-300

No.	Name	Function	Parameter range
39	Standby		0-300
40	Deceleration time constant	The same as 41.	The same as 41
41	Acceleration time constant	①Set value means acceleration time of motor among 0~1000r/min ② Acceleration is linear ③ Only for speed control mode and other control modes are invalid. ④ If driver is combined with external position ring, the parameter shall be set to be 0.	1~2000 *10ms
43	Input gain of analog speed command	Set ratio relationship between analog speed input voltage and practical motor rpm	10~3000 r/min/V
44	Reverse direction of analog speed command	① Reverse the polarity of analog speed input ②When setting is 0 and analog speed command is positive, speed direction is CCW; when setting is 1 and analog speed command is positive, speed direction is CW.	0~1
45	0-deviation compensation of analog speed	0-deviation compensation to analog speed input	-3000 ~3000
46	Lowpass filter of analog speed command	①Lowpass filter for analog speed input. ② The bigger the setting, analog the quicker response speed to speed input and the bigger the signal noise influence; vise verse.	5~300
47	Encoder status output 1	Motor may be abnormal during rotation. Time to output brake command is normally set to be 500 (unit: 2ms).	0~1000
48	Encoder status output 2	When powering on servo, delay time from servo ON to brake release is normally set to be 100(unit: 2ms).	0~1000
49	Encoder status output 3	When servo stops, delay time from servo OFF to brake start is normally set to be 100 (unit: ms).	0~1000
50	Output electronic gear of encoder	To set pulse output number per each rotation of motor. If 0, 10000 pulses are output.	0～9999
52	Special application	If the parameter is set to be 1, direction signal can be taken as enabling signal of driver.	0~1
53	Mandatory enabling setting	To enable servo system to make mandatory enabling without connecting to external enabling and to make motor under excitation condition. The first digit is at far right set to be 1, namely 0001 and effective mandatory enabling.	0000 ~0001
56	Multi-purpose pin selection	When set to 0, P IN30（PIN5）of W/P（F）series CN1 terminal outputs band-type brake signal; when set to be 1, P IN30（PIN5）of W/P（F）series CN1 terminal outputs positioning signal.	0~1
57	Servo ready and reverse alarm	If the first is 1, servo alarm output is reverse; if the second is 1, servo-ready output is reverse.	00~11
54~55	Internal system parameter	Internal system parameter, reserved for use	reserve
58~77	Internal system parameter	Internal system parameter, reserved for use	reserve

Table 7-2 Parameter Code and Function

7.3 Parameter Setting Adjustment

Select "PA-" at the first class menu and press ENT key to enter parameter setting mode. Select parameter number by ▲ and ▼. Press ENT key to display the parameter value.Change the parameter value by ▲ and ▼ keys. Press ▲ or ▼ once, the parameter value increases or decreases by 1. Press and hold ▲ or ▼, the parameter value will increase or decrease continuously.

If parameter is changed, LED decimal point light at far right will turn on. Press ENT key to confirm the value change is valid and now LED light at far right will turn off. The changed value will be reflected to the controller immediately. Then press ▲ or ▼ key to continue to change the parameters. When change completed, press ENT key to return to the parameter selection status.

If you are not satisfied to the value in changing, do not press ENT but press ESC to cancel and restore the parameter to the original one as well as go back to the parameter selection status.

7.3.1 Position of Parameter Operation Interface on the Main Menu

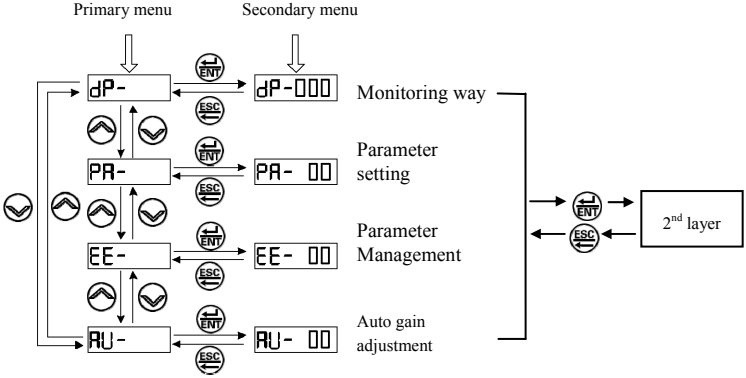


Figure 7-1 Position of Parameter Interface

7.3.2 Restore Default Setting of Driver

Default：set PA1 according to motor model code and carry out EE-dEF operation. Corresponding parameter value is the default value. Steps to restore the factory defaults of motor suitable for the driver:

1) Enter special password of motor parameter, namely PA0=310.
2) Look for the motor model code corresponding to the current motor according to the Motor Model Code List in Section 2.3, Chapter 2.
3) If correct, carry out EE-dEF operation to finish motor default restoring operation; if not, enter motor model code into PA1 and press ENT to enter parameter management menu to carry out EE-dEF operation.

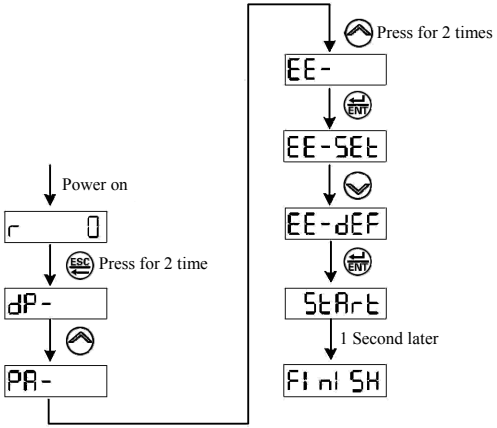


Figure 7-2 Procedures to Restore Default Value

7.3.3 Invoke Motor Code

Parameter	Name	Unit	Parameter range	Default	Applicable mode
PA0	Change parameter password		0～9999	315	P，S
	If PA0＝315, parameters can be changed except PA1 and PA4;				
PA1	Motor model code		0～98	0	P，S

Table 7-3 Invoke Motor Code

For example, to restore the default parameters of motor 130SW06025E (Motor model code: 46), the following steps shall be carried out:

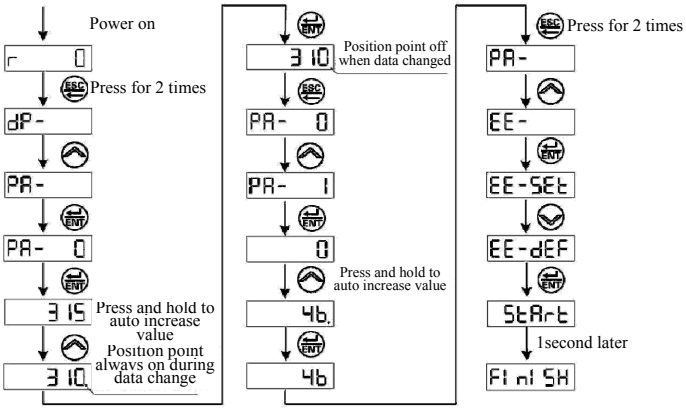

Power on
Press for 2 times
Press and hold to auto increase value
Position point always on during data change
Position point off when data changed
Press and hold to auto increase value
Press for 2 times
1second later

Figure 7-3 Reset to Default Motor Parameters

1) 310 is the special password to set default parameters of motor. PA1 can only be changed when PA0=310.
2) By setting default motor parameter, parameters relevant to motor can be input as default value. User can also judge whether default parameter of drive unit is applicable to the motor driver according to PA1 parameter value (see Section 3, Chapter 2). If PA parameter isn't corresponding to motor model code, motor may work abnormally.
3) It shall press ENT key that parameter can be effective after change, and now the changed parameter value will be reflected to the controller. If you are not satisfied with the changed parameter value, Don't press ENT key, but press ENT key to exit. Parameter will be restored to the value before change.

7.3.4 Change Parameter and Store Parameter Setting

Press selection key ▲ or ▼ to increase or decrease parameters during setting. For example, to change PA9 from 40 to 80:

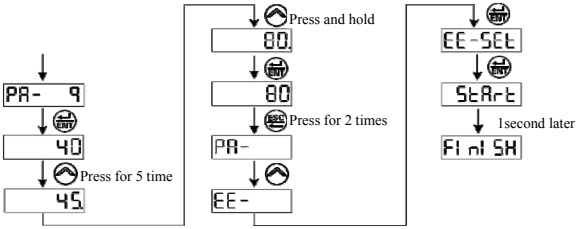


Figure 7-4 Change and Store Parameters

7.4 Parameter Management

Parameter management function mainly controls operation between memory and EEPROM. Select " EE-" at the first class menu, and press ENT key to enter parameter management mode.

First select operation mode from 5 modes by ▼ and ▲ keys. Taking "parameter input"as an example, select " EE-Set" and press down ENT for over 3 seconds, and then display will show "StArt" indicating the parameter is being written into EEPROM. About 1~2seconds later, if operation is done successfully, display will show "FInISH", while if fails, it shows "Error". Press ESC key again to return to the operation mode or selection status.

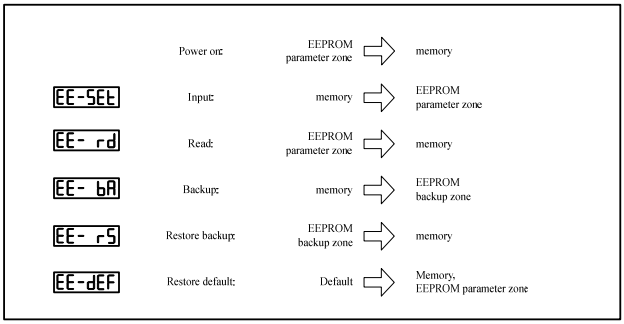


Figure 7-5 Parameter Store and Pickup

1) EE－Set parameter input: to write parameters in the memory into the parameter zone of EEPROM. When user changes the parameter, only the parameter value in the memory changes and it will restore the original value after the next power on. To change the parameter value permanently, user shall carry out parameter input operation to write the parameter in the memory into the EEPROM parameter zone and then the new parameter will be used after the next power on.
2) EE－rd parameter read: to read data of the EEPROM parameter zone in the memory. The process will be carried out again when powered on. At the beginning, the parameter value in the memory is the same as that in the EEPROM parameter zone. But when user changes the parameter, it will display the parameter of the memory. If user is not satisfied to the changed parameter or the parameter is disturbed, user can carry out parameter read operation to transmit the data in the EEPROM parameter zone to the memory again and to restore the parameter when just powered on.
3) EE－bA parameter backup: to write the parameter of the memory into the EEPROM backup zone. The whole EEPROM is divided into parameter zone and backup zone to store 2 sets of parameters. Parameter zone is used for the operations including system power on, parameter input and parameter read, while the backup zone is used for parameter backup and backup restore. In the process of parameter setting, if user is satisfied with 1 set of parameter but still wants to change continuously, user can carry out backup operation first to save memory parameter into the EEPROM backup zone, and then continue to change the parameter. If effect goes poor, user can restore backup to read the parameter saved in the EEPROM backup zone previously out into the memory and then change again or finish the operation. In addition, when parameter set up, user can carry out parameter input and backup operations to make the data in the EEPROM parameter zone to be the same as that in the backup zone to prevent parameter changed carelessly. User can also start back restore operation to read the data in the EEPROM backup zone out into the memory and then write memory parameter into the EEPROM parameter zone by parameter input operation.
4) EE－rS restore backup: to read the data of the EEPROM backup zone out into the memory. Note that the operation is done without carrying out parameter input operation, for which the data of the EEPROM parameter zone will be still read out to the memory after the next power on. If user wants to use the parameter in the EEPROM backup zone permanently, user shall carry out parameter input operation once again.
5) EE－dEF restore default: to read factory defaults of all the parameters out into the memory and write into the EEPROM parameter zone, and user can use default parameter after the next power on. If user disturbs the parameters and the machine cannot work normally, user can restore all parameter defaults by the operation. Because different driver models correspond to different parameter defaults, user shall ensure that the driver model (parameter PA1) is correct before restoring the defaults.

Chapter 8 Operation

8.1 Notes on Operation

To ensure test run is carried out safely and correctly, please check and confirm the following items before test run. In case of any bad condition, please contact with the service division of our company.

- Status of servo motor
  - ✧ Check servo motor to ensure no external damage;
  - ✧ Check fixing components of servo motor to ensure they are connected firmly;
  - ✧ Check servo motor shaft to ensure smooth rotation (it is normal that servo motor shaft with oil seal is a little tighten);
  - ✧ Check encoder connector and power connector of servo motor to ensure correct and firm wiring
- Status of servo driver
  - ✧ Check servo motor to ensure no external damage;
  - ✧ Check servo driver terminal to ensure correct and firm wiring;
  - ✧ Check external power of servo driver to ensure normal voltage.

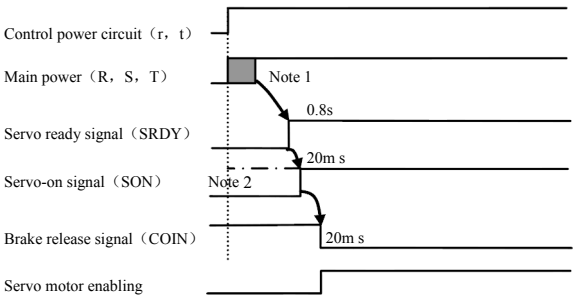
8.2 Grounding

Ground servo motor and driver reliably. To avoid electric shock, protective grounding terminal of servo motor shall be always connected to the protective grounding of controller. For servo driver uses PWM technology to supply power to servo motor through power tube, driver and connecting line may be influenced by switch noise. To meet EMC standards, grounding line shall be strong and thick as possible and grounding resistance shall be small as possible.

8.3 Operation Sequence

8.3.1 Power-on Sequence

- ✧ Connect power to power input terminal of main circuit through electromagnetic contactor (3 phases connected to R, S and T, while single phase connected to R and T).
- ✧ Control circuit power r and t are connected at the same time of or after main circuit power. If only control circuit power connected, servo ready signal (SRDY) is OFF.
- ✧ When main circuit power is connected, servo-ready signal (SRDY) will be on about 0.8 second later, and now it's Ok to receive servo-on (SON) signal. When serve-on is detected to be effective, frame circuit opens and motor stimulates under running status. If servo-on is detected to be invalid or with alarm, frame circuit will be turned off and motor will be in free status.
- ✧ When servo-on is connected together with power, frame circuit will be connected about 0.8sec later.
- ✧ Frequency connection and disconnection of power may damage soft start circuit and dynamic brake circuit. Therefore, it's better to limit connection/disconnection frequency to be 5 times/hour and under 30 times per day. If driver or motor is too heated, power can only be connected after 30-minute cooling since troubleshooting.



Note 1: main power shall be connected at the same time of or after control power is connected.

Note 2: SON signal is input, but driver doesn't receive it until 20ms later after driver sends SRDY signal.

8.3.2 Alarm Sequence

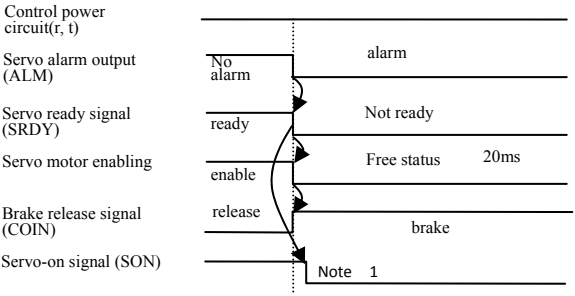


Figure 8-2 Alarm Sequence

Note 1: SON signal shall be off reliably in case of alarm.

8.3.3 Brake Sequence

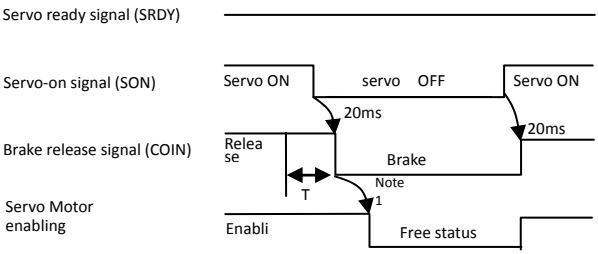


Figure 8-3 Brake Sequence Figure

Note 1: Brake release signal will be off if servo signal SON signal disconnected for 20ms during normal running.

8.4 Commissioning

After installation and wiring, check the following items before power on and operation:

- ✧ TB wiring of power terminal TB is correct and reliable input voltage is correct;
- ✧ Power line or motor line is shorted or grounded;
- ✧ Encoder cable is connected correctly;
- ✧ Control signal terminal is connected correctly;
- ✧ Power polarity and amount are correct;
- ✧ Driver and motor are fixed firmly;
- ✧ Motor shaft is not connected with load.

8.5 Control Mode

EVTA W series servo version includes the following control modes:

Parameter	Name	Unit	Parameter range	Default	Applicable mode
PA4	Work mode selection		0～9	0	P，S

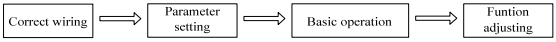
PA4

- ✧ PA4=0 ： position mode；
  Set motor rotation direction and angle by digital pulse. In such work mode, driver unit can control motor rotor to rotate for the set angle (position). Both rotation angle (position) and speed cn be controlled.
- ✧ PA4=1 ： internal digital command speed mode:
  User can set values of PA24～PA27 and select value from them as internal speed command according to the status combination of CN1 input points SC1 and SC2 corresponding to motor speed.
- ✧ PA4=3 ： manual test run mode of motor:
  First set the starting speed of PA21 and then operate by„ and keys to accelerate or decelerate.
- ✧ PA4=4 ：zero test mode of motor；it has been set up before leaving the factory and user needn't to adjust.
- ✧ PA4=5 ： measuring mode of motor load inertia can assist automatically measuring load inertia and provide parameter setting reference.
- ✧ PA4=9 ： position/speed switch work mode
- ✧ PA4=6~8 is the reserved interval parameter of the system.

Table 8-1 Control Mode Selection

Note：PA0 shall be changed to be 310 during parameter changing.

Generally, a new drive unit shall be operated through four steps as follows. The section mainly describe the first three steps to help user operate the servo drive device quickly. For function adjustment as required by the user, refer to Function Adjustment.



8.5.1 Position Control Mode

First connect the wire in correct way. Note that the required input signals shall be connected as shown blow.

Required input signal	Terminal No.		Function
	W/P Series	F Series	
COM+	CN1 -26、10	CN1-1	Common terminal of input point as input terminal of control power
SON	CN1 -25	CN1-14	Servo enabling signal, by which motor enabling can be controlled independently
PULS+	CN1 -28	CN1-20	Position command input with mode as follows: 1. pulse + direction；2. CCW pulse +CW pulse；3. Quatrature pulse A/B phase
PULS-	CN1 -12	CN1-7	
SIGN+	CN1 -27	CN1-19	
SIGN-	CN1 -11	CN1-6	

Table 8-2 Required Wiring

Then confirm correct connection and keep all input signals OFF to connect power and then set the required parameter.

Required parameter	Parameter description
PA4	PA4=0 select position mode. Note: parameter shall be changed from PA0 to 310 during change.
PA12 PA13	Electronic gear function of position command: PA12=pulse command multiplier parameter； PA13 is pulse command division factor.
	Set electronic gear ratio of position command to match various pulse commands. Formula to compute the gear ratio is as shown below: $S = \frac{I}{\delta} \cdot \frac{CR}{CD} \cdot \frac{PA12}{PA13} \cdot \frac{L}{4C} \cdot \frac{ZD}{ZM}$
PA14	Select position command pulse mode
	PA14=0 ： pulse + direction； PA14=1 ：CCW pulse＋CW pulse；PA14=2 ：2-phase quardrature pulse input；PA14=3：2-phase quardrature pulse input +（pulse + direction）。
PA15	Position command direction is opposite
	PA15＝0：keep original command direction；PA15＝1：pulse command direction input is opposite

Table 8-3 Required Parameter Setting

Finally, carry out basic commissioning.

- ✧ When the required parameter is set up, carry out parameter input operation (refer to the operation instruction for EE-SEt in the parameter management)
- ✧ First turn on the SON and keep it under 0 speed, then give position pulse command with smaller frequency to start motor. Observe motor current by monitoring dP-I. In normal condition, displayed current value will not exceed the rated motor current.
- ✧ Slowly increase the speed of position command to accelerate the motor following the commands. Meanwhile, monitor whether motor under running status is of vibration or noise, whether speed is stable and whether motor current will exceed the rated current.
- ✧ Motor can run following the command within the rated rpm and when it stops the position displayed on dP-CPo is equal to the pulse number computed by dP-PoS × PA13/PA12. User can directly carry out other adjustments.
- ✧ During the operation of position mode, the following abnormality treatment will often be taken:

No.	Abnormal conditions in adjustment	Treatment
1	dP-CPo Displays no data and motor doesn't work after enabling	Test command wiring and upper computer.
2	dP-CPo Displays data but motor doesn't work	Check enabling signal and the required parameter setting.
3	Rotation direction of motor is different;	Refer to Rotating Direction Switch of Motor
4	Motor is abnormal with vibration and noise;	Refer to the Basic Performance Parameter Adjustment
5	Motor doesn't work	Pay attention to the mode of inspection command source, and set correctly according to PA14.
6	dP-CPo Displayed data is different from the pulse number of command source.	1) Check the shielding treatment of control signal line 2) Keep away from the disturbing source.

Table 8-4 Treatment of Abnormal Position Control

8.5.2 Internal Speed Control Mode

First, connect the required input signals as shown in the following list.

Required input signal	Terminal No.		Function
	W/P Series	F Series	
COM+	CN1-26、10	CN1-1	Common terminal of input point as input terminal of control power
SON	CN1 -25	CN1-14	Servo-on signal can control motor enabling indepently。
SC1	CN1 -23	CN1-16	Speed selection1
SC2	CN1 -7	---	Speed selection2

Table 8-5 Signal Connection

Confirm connection correct, keep all signal input OFF, connect power and set the required parameter.

<table>
<tr><th>Required parameter</th><th>Name</th><th>Setting</th><th>Remark</th><th>Applicable mode</th></tr>
<tr><td rowspan="2">PA4=1</td><td>Select internal digital command speed mode</td><td>1</td><td>Change P A0 to 310</td><td>P，S</td></tr>
<tr><td colspan="4">
<table>
<tr><th rowspan="2">Command Default</th><th rowspan="2">Running speed</th><th colspan="2">I/O state of the selected speed</th></tr>
<tr><th>SC1（CN1-23）</th><th>SC2（CN1-7）</th></tr>
<tr><td>PA24＝100.0</td><td>Inner speed 1</td><td>OFF</td><td>OFF</td></tr>
<tr><td>PA25＝-50.0</td><td>Inner speed 2</td><td>OFF</td><td>ON</td></tr>
<tr><td>PA26＝200.0</td><td>Inner speed 3</td><td>ON</td><td>OFF</td></tr>
<tr><td>PA27＝-300.0</td><td>Inner speed 4</td><td>ON</td><td>ON</td></tr>
</table>
</td></tr>
</table>

Table 8-6 Required Parameter Setting

Finally, carry out basic commissioning.

- ✧ When the required parameter is set up, carry out parameter input operation (refer to the operation instruction for EE-SEt in the parameter management)
- ✧ Keep input signals SC1 and SC2 off. If SON is on, motor will run at its internal speed, namely 100.0 r/min. observe motor current by monitoring dP-I. Normally, the current value displayed will not exceed its rated current.
- ✧ Four different internal speeds can be switched by the combination of SC1 and SC2. Meanwhile, monitor whether motor under running status is of vibration or noise, whether speed is stable and whether motor current will exceed the rated current.
- ✧ If the motor runs normally at four internal speeds, user can carry out other adjustments.
- ✧ During the operation of position mode, the following abnormality treatment will often be taken:

No.	Abnormal conditions in adjustment	Treatment
1	Rotary directions of motors are different;	See "Rotating Direction Switch of Motor"
2	Motor vibration and noise;	See "basic performance parameter adjustment"
3	Status of speed selection input signal not corresponding to motor rotation speed	Check dP- In to judge input signal is correct (switch input point)

Table 8-7 Treatment of Abnormal Speed Mode

8.5.3 Operating Speed Mode of External Analog Input

Connect wire correctly first, but be cautious that the required input signal in the following list shall be connected.

Required input signal	Terminal No.		Function
	W/P Series	F Series	
COM+	CN1 -26	CN1-1	Common terminal of input point as input terminal of control power, 12~24V
COM-	CN1-21,、5、13、29	CN1-18	Common terminal of output point as control power ground line, 0V
SON	CN1 -25	CN1-14	Servo-on signal
ALM	CN1 -14	CN1-17	Servo alarm signal
RSTP	CN1 -24	CN1-15	CW drive inhibit
FSTP	CN1 -8	CN1-3	CCW drive inhibit
AGND	CN1 -32	CN1-9	Analog grounding
COMDIN	CN1 -33	---	Analog speed command input
AS+	---	CN1-21	Analog input command+
AS-	---	CN1-8	Analog input command-
A+	CN1 -3	CN1-11	Encoder A+ output
A-	CN1-18	CN1-23	Encoder A- output
B+	CN1 -2	CN1-12	Encoder B+ output
B-	CN1 -17	CN1-24	Encoder B- output
Z+	CN1 -1	CN1-13	Encoder Z+ output
Z-	CN1 -16	CN1-25	Encoder Z- output

Table 8-8 Required Signal Connection

Note: To improve anti-interference performance, it is better no to connect three grounds together. Confirm connection is correct and then keep all input signals OFF. Connect power and then set required parameter.

Required parameter	Name	Setting	Function	Parameter range
PA4	Control mode selection	1	Set speed control mode	0~9
PA22	Internal speed command selection	1	① If set to be 0, speed command is from internal speed; ② If set to be 1, speed command is from external analog input.	0~1
PA40	Deceleration time constant	100	The set value means acceleration/deceleration time of motor from 0 to 1000r/min	1~2000 (Unit:10ms)
PA41	Acceleration time constant	100	The set value means acceleration/deceleration time of motor from 0 to 1000r/min	1~2000 (Unit:10ms)
PA43	Input gain of analog speed command	350	To set the percentage relationship between analog speed voltage and the practical motor rpm	10~3000 (Unit: 1r/min/V)
PA44	Reverse direction of analog speed command	0	①Take reverse polarity of analog speed input; ②If set to be 0 and analog speed command is positive, the speed direction is CCW; if set to be 1, analog speed command is positive, the speed direction is CW.	0~1
PA45	0-deviation compensation of analog speed command	0	0-deviation compensation to analog speed input	-3000~3000
PA46	Lowpass filter of analog speed command	32	①Lowpass filter for analog speed input; ② The bigger the setting, the quicker the response and the bigger the signal noise; and vise versa	1~300
PA50	Encoder output electronic gear	0	The parameter can set the pulse output number of each rotation. If set to be 0, it output 10000 pulses.	0~9999

Table 8-9 Parameter Setting of the External Analog Input Mode

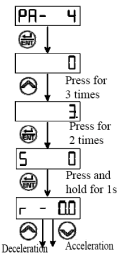
8.5.4 Manual Commissioning Control Mode

When the driver is powered on, ii will display r - 0 normally. In case of fault, it will display alarm code Err-00 and now please refer to Abnormality and Troubleshooting

Required parameter	Name	Unit	Parameter range	Default	Applicable mode
PA4	Work mode selection		0~9	3	P，S
Auto start	Internal startup				

Table 8-10 Manual Commissioning Control Mode

Operations for manual test run of motor are as shown below:



1. Drive unit displays r - 0 when just powered on as motor running speed monitoring window
2. Check PA1 is corresponding to the motor (Chapter 2-5)。 If correct, it will skip the step, or else it will call out the default parameter of drive unit corresponding to the servo motor.
3. Enter PA4 to set PA4=3 (note:PA0 shall be set to be 310 during changing); select manual test run mode. Enter according to the steps as shown in the left figure and press “OK” to confirm the operation. Then it will display “S 0”.
4. Force to trigger internal enabling automatically (confirm motor shaft rotates free from any risk before enabling)
5. Press “OK” again to hold for 1s, and then motor will rotate at the speed given by the PA21 parameter.
6. Press and hold key to speed up motor rotation; release to key and the speed will not change; press and hold key to slow down motor until 0 since when it will rotate reversely.

Table 8-11 Manual Test Run Steps

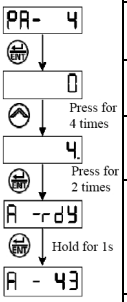
8.5.5 Zero Test Mode of Motor

When the driver is powered on, ii will display r 0 normally. In case of fault, it will display alarm code Err-□□ and now please refer to Abnormality and Troubleshooting

Required parameter	Name	Unit	Parameter range	Default	Applicable mode
PA4	Work mode selection		0～9	4	P，S
Auto start	Internal startup				

Table 8-12 Zero Test Mode of Motor

Operations for zero test mode of motor (PA4=4) are as shown below:



1. Drive unit displays r - 0 when just powered on as motor running speed monitoring window when just powered on as motor running speed monitoring window
2. Check PA1 is corresponding to the motor (Chapter 2-5)。If correct, it will skip the step, or else it will call out the default parameter of drive unit corresponding to the servo motor.
3. Enter PA4 to set PA4=3 (note: PA0 shall be set to be 310 during changing); select 0-test mode of motor pole. Enter according to the steps as shown in the left figure and press “OK” to display “A—RDY”.
4. Force to trigger internal enabling automatically (confirm motor shaft rotates free from any risk before enabling)
5. Press “OK” and hold for 1s, and motor will rotate under the set mode. When it display “A。—XXX”, test completes. The measured data shall be close to 0 or 1024. The difference between the data and 0 or 1024 is the deviation of pole position. If the deviation more than 20, user can manually set the deviation into No. 70 parameter for correction.
6. Now press “Back” key to display “A—RDY” to test again. Press “Back” key to return to the “PA” interface.

Table 8-13 Motor Zero-test Steps

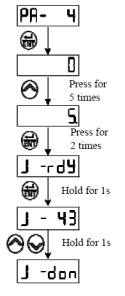
8.5.6 Load Inertia Test mode of Motor

When the driver is powered on, ii will display r 0 normally. In case of fault, it will display alarm code Err-□□ and now please refer to Abnormality and Troubleshooting

Required parameter	Name	Unit	Parameter range	Default	Applicable mode
PA4	Work mode selection		0～9	5	P，S
Auto start	Internal startup				

Table 8-14 Load Inertia Test mode of Motor

Operations for motor inertia measuring mode (PA4=5) are as shown below:



1. Drive unit displays r - 0 when just powered on as motor running speed monitoring window
2. Check PA1 is corresponding to the motor (Chapter 2-5)。If correct, it will skip the step, or else it will call out the default parameter of drive unit corresponding to the servo motor.
3. Enter PA4 to set PA4=5 (note: PA0 shall be set to be 310 during changing); select motor inertia measuring mode. Enter according to the steps as shown in the left figure and press “OK” to display “J—RDY”.
4. Force to trigger internal enabling automatically (confirm motor shaft rotates free from any risk before enabling)
5. Press “OK” and hold for 1s, and motor will rotate under the set mode. When motor stops, it displays “ J—XXXX” which is the measured inertia. Press ＋ or – for 1S and the nit will display “J—8888” to indicate measure mistake. If displaying “J—DON”, it indicates the system has changed the system parameter and trigger it according to the measured data, or the existing parameter of the system is the same as the measured data and the measured result has been saved.
6. Now press “Back” key to display “A—RDY” to test again. Press “Back” key repeatedly to return to the “PA” interface.

Table 8-15 Steps to Measure Motor Load Inertia

8.5.7 Position and Speed Switching Mode

1. If PA4=9, the system works under position and speed switching mode; mode switch signal is ALRS which is the external input signal at the 9th pin of CN1 socket.
2. If external input disconnected (high-resistance) or input is 24V, it is position mode.
   If external input is 0V, it is speed mode.
3. Input signal status under the two work modes can be changes at any time, but only when the speed is reduced to 0, the two modes start to switch.
   To switch position and speed modes, first connect wire correctly, but be cautious that the required input signals in the following table shall be connected.

Required input signal	Terminal No.		Function
	W/P Series	F Series	
COM+	CN1-26、10	CN1-1	Common terminal of input point as input terminal of control power. 12~24V。
COM-	CN1-21, 5, 13,29	CN1-18	Common terminal of output point as control power ground line. 0V
SON	CN1-25	CN1-14	Servo-on signal to control motor enabling function separately
ALM	CN1-14	CN1-17	Servo alarm signal
PULS+	CN1-28	CN1-20	position command pulse input
PULS-	CN1-12	CN1-7	
SING+	CN1-27	CN1-19	position command direction input
SING -	CN1-11	CN1-6	
AGND	CN1-32	CN1-9	Analog signal ground
AS	CN1-33	---	Analog speed command input
AS+	---	CN1-21	Analog input command +
AS-	---	CN1-8	Analog input command -
ALRS	CN1 -9	CN1-2	Mode switch signal

Table 8-16 Required Signal Connection

Then confirm connection is correct, keep all input signals OFF, connect power and then set the required parameter.

Required parameter	Name	Setting	Function	Parameter range
PA4	Control mode selection	9	To set speed control mode	0~9
PA22	Internal speed command selection	1	① If set to be 0, speed command is from internal speed; ②If set to be 1, speed command is from the external analog input.	0~1
PA40	Deceleration time constant	100	The set value means deceleration time of motor from 0 to 1000r/min	1~2000 (Unit：10ms)
PA41	Acceleration time constant	100	The set value means acceleration time of motor from 0 to 1000r/min	1~2000 (Unit：10ms)
PA43	Input gain of analog speed command	200	To set the percentage relationship between analog speed voltage and the practical motor rpm	10~3000(Unit ：r/min/V)
PA45	0-deviation compensation of analog speed command	0	0-deviation compensation to analog speed input	-3000~3000
PA20	Invalid drive inhibit input	0	①0：CCW and CW input inhibit is valid. When CCW drive inhibit switch (FSTP) is ON, CCW drive permits; when CCW drive inhibit switch (FSTP) is OFF, CCW torque keeps at 0. It is the same as CW direction. If CCW and CW drive inhibits are OFF, it may cause wrong alarm of drive inhibit input. ②1：Cancel CCW and CW input inhibit operation. No matter what switch condition of CCW and CW drive inhibit is, CCW and CW drives will permit	0~1

Required parameter	Name	Setting	Function	Parameter range
			Meanwhile, if CCW and CW drives are OFF, no wrong alarm of drive inhibit will occur.	
PA44	Reverse direction of analog speed command	0	①Reverse the polarity of analog speed input ②When setting is 0 and analog speed command is positive, speed direction is CCW; when setting is 1 and analog speed command is positive, speed direction is CW.	0~1
PA46	Lowpass filter of analog speed command	32	①Lowpass filter for analog speed input. ②The bigger the setting, analog the quicker response speed to speed input and the bigger the signal noise influence; vise verse.	5~300
PA50	Electronic gear of encoder output	0	To set pulse output number per each rotation of motor. If 0, 10000 pulses are output.	0~9999

Table 8-17 Position and Speed Switching Mode Parameters

Note: to set speed control, acceleration/deceleration parameters PA40 and PA41 can be set as 2000 at most. (Unit: 10ms).

8.6 Application of Brake Release Signal

To lock vertical or inclined work platform connected to the motor and prevent work platform from falling when servo alarm or power off, it is generally adopts servo motor with band-type brake. To effectively control the motion of band-type brake motor, the servo unit provides band-type brake signal (COIN). (Note: the band-type brake can only be used to keep work platform bur absolutely shall not be sued to slow down or stop the machine from running).

First, refer to Figure 8-4 to connect wire correctly, but be cautious that the required input signals I the following table shall be connected.

Required input signal	Terminal No.		Function
	W/P Series	F Series	
COM+	CN1 -26、10	CN1 -1	Common terminal of input point as input terminal of control power
SON	CN1 -25	CN1 -14	Servo-on signal
COIN	CN1 -30	CN1 -5	Band-type brake release signal
COM-	CN1-21、5、13、29	CN1 -18	

Table 8-18 Required Wiring of Band-type Brake Release Signal

Figure 8-4 is the schematic wiring diagram that the band-type brake release signal uses to control band-type motor in practice. 24V power in the figure shall be provided by user. When receiving the band-type brake release signal (COIN, COM-), pay attention to the power polarity. For detail, see the figure below:

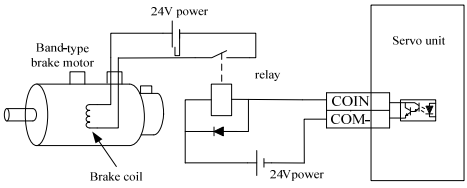


Figure 8-4 Wiring Diagram in the Application of Band-type Release Signal Controlling Band-type Motor

Motors with different powers require different band-type brakes. When selecting 24V switch power, user shall refer to the technical parameters of brakes for different motors as shown in the table below.

Motor frame No.	Rated torque (N.m)	Power voltage (V)	Brake coil power (20℃,W)	Release time (s)
110	4	24VDC	20	0.037
130	8	24VDC	25	0.042
180	32	24VDC	40	0.135

Table 8-19 Technical Parameters of Brakes for Different Motors

Confirm connection is correct, keep all input signals OFF, connect power and then set the required parameter. In the consideration of the sequence relationship between COIN signals, if the machine or work platform moves a little under gravity, please make time adjustment by the following parameters relevant to band-type brake action.

Parameter	Name	Unit	Parameter range	Default	Applicable mode
PA47	Brake time constant 1	2ms	0～1000	0	P，S
PA48	Brake time constant 2	2ms	0～1000	0	P，S
PA49	Brake time constant 3	2ms	0～1000	0	P，S

Table 8-20 Relevant Parameter Adjustment

Three conditions to cause the sudden turnoff of servo unit and corresponding solutions are as shown below:

Case 1: Servo unit turns off suddenly when motor moving as shown in Figure 8-5.

When drive unit is moving at high-speed, it cannot make band-type brake suddenly, or else it may damage brake. It is necessary to start band-type brake release signal COIN at proper time. Rational adjustment of PA47 can enable motor to decelerate first and then make band-type brake. PA47 shall be set according to the practical mechanical action.

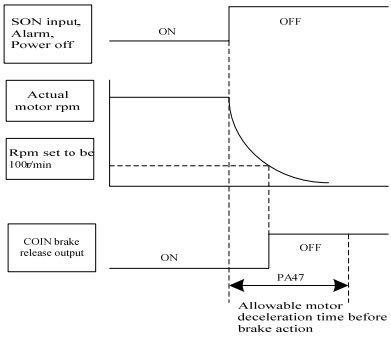


Figure 8-5 Sudden Turnoff of Servo Unit When Motor Moving

Case 2: Servo unit turns off suddenly when motor is in idle state as shown in Figure 8-6.
Generally, when COIN outputs, servo unit will delay its turnoff. Because when drive unit is powered off, energy will be released through energy consumption brake circuit in short time, if PA48 is set too big, the actual delay time of servo unit will not exceed the time of energy release. However, energy release time is related to load inertia or motor deceleration time. Therefore, when the machine or work platform moves a little for gravity, user can adjust PA48 to make servo unit to delay excitation off time so as to hold work platform before brake action and to prevent deviation.

Case 3: Servo unit starts suddenly when motor is in idle state as shown in Figure 8-7.
Generally, when motor is inhibited and servo unit starts suddenly, band-type brake release signal COIN will be delayed to output. When the machine or work platform is suddenly powered on under the gravity effect, band-type brake signal cannot be released suddenly to prevent the machine or work platform from moving. User can adjust PA49 to speed up motor first and then release band-type brake so as to hold work platform and to prevent deviation.

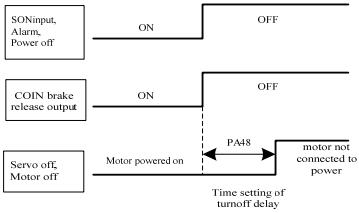


Figure 8-6 Sudden Turnoff Sequence of Servo Unit in Idle State

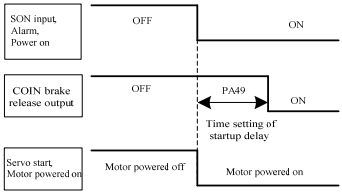


Figure 8-7 Sudden startup Sequence of Servo Unit in Idle State

8.7 Rotating Direction Switch of Motor

Rotation direction of motor is set as below:

Required parameter	Name	Unit	Parameter range	Default	Applicable mode
PA15	Reverse direction of position command		0～1	0	P
	PA15=0 ： keep original command direction; PA15=1 ： reverse the pulse command direction.				

Table 8-21 Direction Setting of Motor Rotation

When all parameters of servo unit are set to be default, A and B phase signal of motor encoder is as follows:

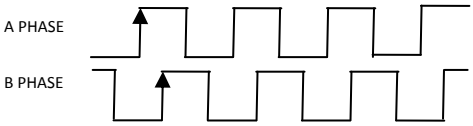


Figure 8-7 Pulse Input under Standard Setting

Under the situation of servo motor wiring not changed, servo unit can make servo motor to rotate in reverse direction in “reversing mode”, and now A and B phase signal of motor encoder is as follows:

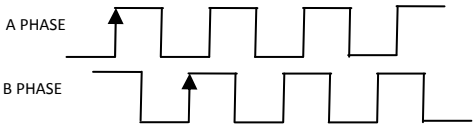


Figure 8-8 Pulse Input under Reversing Mode

8.8 Basic Performance Parameter Adjustment

PA5 (percentage gain of speed ring):

The bigger the PA5 percentage gain of speed ring, the stronger the servo rigidness. But if it is too big, motor may easily vibrate when it starts or stops(motor has noise sound), while the smaller the value, the slower the response. User can increase or decrease by 20 under default each time of adjustment and then observe the effect. But pay attention that the range of PA5 is 15～250.

PA6 (Integral factor of speed ring):

The bigger the PA6 integral factor of speed ring, the quicker the response. However, if it is set too big, the system will be unstable and even vibrate; the smaller the value, the slower the response. If the set value is too small, the integral effect will decrease but cannot reduce the deviation of stable state. User can increase or decrease by 1 under default each time of adjustment and then observe the effect. But pay attention that the range of PA6 is 4～500.

Percentage gain and integral factor of speed ring shall be adjusted according to the detailed servo motor model and load. Generally, the bigger the load inertia, the smaller the set value shall be.. in the condition of the system without any vibration, two parameter values shall be set as big as possible.

The following figure displays the step input response curves when driving some motor with certain inertia load. Wherein:

Curve 1: step input curve when PA5 is set to be a small value and PA6=0; motor is soft and dynamic response is slow with much big state error;

Curve 2: Speed step input curve when PA5 and PA6 is properly set; motor rigidness is proper and dynamic response is quick;

Curve 3: Speed step input curve when PA5 is small but PA6 is big; instant overshooting is at its most and motor is easily to vibrate.

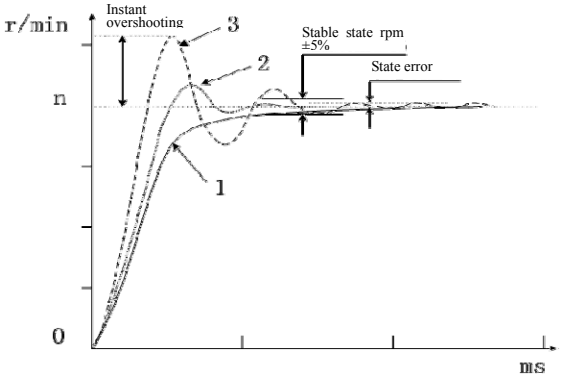


Figure 8-9 Response Curve of Step Command Input

PA8 （Filter factor of speed feedback）

The bigger the filter factor of speed feedback is, the quicker the speed feedback response is. If set too big, motor may generate much electromagnetic noise. The smaller the set value, the slower the speed feedback response is. If set too small, the bigger the speed fluctuation. And even vibration may occur. User can increase or decrease by 50% of the original value under default each time of adjustment and then observe the effect. But pay attention that the lower limit of PA8 shall not be less than 16.

PA9 (Percentage gain of position ring):

Position ring of the drive unit adopts simple P adjustment that closed position ring can work when carrying out position mode and directional function of speed mode.

The bigger the percentage gain of position ring is, the quicker the response to position command and the stronger the rigidness is. If set too bigger, motor may generate overshooting and then cause vibration when it starts or stops. The smaller the set value, the slower the response and the bigger the following error is. User can increase or decrease by 5 under default each time of adjustment and then observe the effect. But pay attention that the range of PA9 is 25-60.

PA10 (Feedforward gain of position ring), PA11 (Feedforward filter factor of position ring):
PA10 can use speed data of position command to adjust speed ring. The bigger the set value, the smaller the following error. If it is set too big, motor may be easily to generate instant overshooting and vibration.

Actually, PA11 is used to smooth the feedforward control of position command. The bigger the set value is, the quicker the response to step speed command is. It can better control position overshooting and vibration caused by sudden change of command speed. The smaller the set value is, the more unobvious the feedforward control and the smaller the vibration caused by feedforward control.
Generally speaking, PA10 (feedforward gain of position ring) and PA11 (cutoff frequency of feedforward lowpass filter) may not be used.

8.9 Self-testing Gain Parameter Adjustment

8.9.1 Motor Model Confirmation

Change value code of PA1 parameter according to motor model and then carry out default callout operation to finish matching of motor model. In common situation, PA1 parameter of servo driver delivered to support EVTA servo motor has been changed, and so the step can be omitted.

8.9.2 Measure of Load Inertia

After automatically measuring load inertia, PA33 parameter will change automatically correspondingly and meanwhile parameters to link auto setting includes PA5 and PA6 (Note: to save the parameter changed, it shall carry out parameter saving operation, or else the auto changed parameter is only valid before poweroff and will be restored to be the previous saved value after restart). If the machine vibrate due to the parameter setting, please refer to the Mechanical Rigidness Setting to reduce the setting class.

8.9.3 Basic Parameter Block Diagram

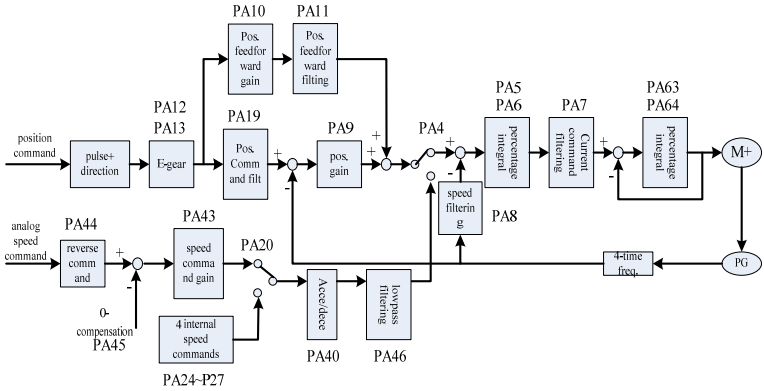


Figure 8-10 Basic Parameter Block Diagram

8.9.4 Rigidness Setting of EVTA Servo Corresponding Machine

Rigidness grade	Loop gain of position [1/s]（PA9）	Loop gain of speed [1/HZ]（PA5）	Loop Integral constant [ms]（PA6）	Speed filter time constant（PA8）	Current filter time constant（PA7）
2	20	20	45	64	256
3	30	30	30	64	256
4	40	40	20	64	256
5	60	50	16	96	384
6	80	60	13	128	512
7	120	70	11	128	512

Table 8-16 Mechanical Rigidness Setting

Note: In some special conditions, gain cannot be set accurately:

① Load inertia too big. E.g., measured data more than 1200.

② Load inertia fluctuates quite.

③ Load rigidness too low.

④ Load parts are not connected firmly such as much big backlash.

8.10 Computed Value

If mechanical system inertia cannot be measure by the methods mentioned above, we provide the following equation for EVTA servo to get correct value of the parameter PA33.

PA33＝(motor inertia+ load inertia converted from motor shaft value) ×100×rated current/torque

When mechanical rigidness setting increased, EVTA servo gain increases but positioning time shortens. However, if setting too high, motor noise will be big and the machine may vibrate. Now, please adjust set value down. Mechanical rigidness shall be set at grade 4 generally and only some cases require grade 5. When rigidness grade set down, motor load inertia shall be set correctly in servo system with setting parameter as PA33. It can be said that the process of parameter adjustment of mechanical system is the process of adjusting inertia parameter PA33, which makes the adjustment process more easy and effective.

Chapter 9 Maintenance and Inspection

9.1 Maintenance Notice

① Maintenance personnel shall be with relevant professional knowledge and capability.

② Do not touch servo driver and motor within 5 minutes after power off to avoid electric shock and burning.

③ Any fault alarm sent by the driver shall be troubleshoot according to alarm code before putting the drive into use again.

④ Before resetting alarm, confirm that SON (servo effective) signal is invalid to avoid motor starting up suddenly and causing accident.

9.2 General List of Alarm Codes

Alarm code	Alarm name	Content
--	Normal	
1	Overspeed	Speed of servo motor exceeds the set value.
2	Overvoltage of main circuit	Power voltage of main circuit is too high.
3	Undervoltage of main circuit	Power voltage of main circuit is too low.
4	Too poor position	Value on position deviation counter exceeds the set value
7	Abnormal drive inhibit	Both CCW and CW drive inhibit inputs are OFF
9	Encoder fault	Wrong encoder signal
11	IP M module fault	IP M smart module is of fault.
12	Speed regulator saturated	Poor wiring between motor and driver
13	Overload	Servo driver and motor are overloaded (transient overheating)
14	Braking fault	Braking circuit in fault
15	Abnormal braking	Abnormal braking circuit
24	Current sampling circuit in fault	Current sampling circuit in fault

Table 9-1 General List of Alarm Codes

9.3 Alarm Processing Methods

Alarm code	Alarm name	Running status	Cause	Treatment
1	Overspeed	Occur when connecting control power	①control circuit board in fault ② encoder in fault	① change servo driver ② change servo motor
		Occur during motor running	Input command pulse too frequently	Set input command pulse correctly
			Acceleration/deceleration time constant is too small and speed overshooting is too big.	Increase acceleration/deceleration time constant
			Input electronic gear ratio too big	Set correctly
			Encoder in fault	Change servo Motor
			Poor encoder cable	Change encoder cable
			Unstable servo system causes overshooting	① Reset relevant gains ② If gain cannot be set properly, decrease load rotary inertia ratio
		Occur when motor just starts up	Load inertia too big	① Decrease load inertia ② Change to driver and motor with bigger power
			Wrong encoder zero	① change servo Motor ② zero set encoder
			①U, V and W leads of motor connected wrong; ② Encoder cable lead connected	Wiring correctly

Alarm code	Alarm name	Running status	Cause	Treatment
			wrong	
2	Main circuit overvoltage	Occur when connecting control power	Circuit board in fault	Change servo driver
		Occur when connecting main power	①Source voltage too high ②Abnormal power voltage waveform	Check power supply
		Occur during motor running	Brake resistance wiring disconnected	Reconnect wire
			①Brake transistor damaged ②Internal brake resistance damaged	Change servo driver
			Capacity of brake circuit not enough	①Reduce start-stop frequency ② Increase acceleration/deceleration time constant; ③reduce torque limit ④Decrease load inertia; ⑤Change to driver and motor with bigger power
3	Main circuit undervoltage	Occur when connecting main power	①Circuit board in fault ②Power fuse damaged ③Soft start circuit in fault ④Rectifier damaged	Change servo driver
			① Low power voltage ② Temporary poweroff for over 20ms	Change power source
		Occur during motor running	① Power capacity not enough ② Instant power off	Change power source
			Radiator overheated	Check load
4	Position too poor	Occur when connecting control power	Circuit board in fault	Change servo driver
		Motor doesn't run when	①U, V and W lead of motor connected wrong ②Encoder cable lead connected wrong	Connect wire correctly
			Encoder fault	Change servo motor
		Occur during motor running	Set inspection range of too poor position	Add inspection range of too poor position
			Position ratio gain too small	Increase gain
			Torque not enough	① Check torque limit; ② reduce load capacity; ③ Change to driver and motor with bigger power
			Command pulse frequency too high	Reduce frequency
			① Cable disconnected; ② Internal temperature relay of motor damaged	①Check cable ②Check motor
		Occur during motor running	Motor overload	① Reduce load; ② Reduce start-stop frequency; ③ Reduce torque limit; ④ Reduce relevant gain; ⑤Change to driver and motor with bigger power
			Internal fault of motor	Change servo motor
			Overload	① Reduce load; ②Change to driver and motor with bigger power
			Overload	①Reduce load; ②Change to driver and motor with bigger power
7	Abnormal		Both CCW and CW drive inhibit input	Check wiring and power for input terminal

Alarm code	Alarm name	Running status	Cause	Treatment
	drive inhibit		terminals are disconnected	
9	Encoder fault		Incorrect encoder wiring	Check wiring
			Encoder damage	Change motor
			Poor encoder cable	Change cable
			Too long encoder cable causes too low power voltage of encoder	① Shorten cable ② Power by multi-core parallel cables
			Wrong model code. Use non wire-saving motor by wire-saving encoder motor code	① Use correct motor model code ② Non wire-saving motor shall use its corresponding model code
			① Poor internal connector of driver; ② Abnormal switch power; ③ Chip damaged	①Change driver ② Check connector ③ Check switch power
11	IPM module in fault	Occur when connecting control power	Circuit board in fault	Change servo driver
		Occur during motor running	① Power voltage too low ② Overheating	①Check driver ② Power on again ③Change driver
			Short circuit among driver U, V and W	Check wiring
			Poor grounding	Grounding correctly
			Motor insulation damaged	Change motor
			Disturbed	①Add line filter ②Away from the disturbance source
12	Speed regulator saturated	Occur during motor running	①One of the U, V AND W wiring disconnected ②Incorrect encoder wiring	Check wiring
13	Overload	Occur when connecting control power	Circuit board in fault	Change servo driver
		Occur during motor running	Run by over the rated torque	Check load
			Holding brake isn't ON	Check holding brake
			Unstable motor oscillation	① High-speed gain ② Increase acceleration/deceleration time ③Decrease load inertia
14	Regular brake fault	Occur when connecting control power	Circuit board in fault	Change servo driver
		Occur during motor running	①brake resistance wiring disconnected	Re-connect the wire
			①brake transistor damaged ②Internal brake resistance damaged	Change servo driver
			capacity of brake circuit not enough	①Reduce start-stop frequency ② increase acceleration/deceleration time constant ③reduce torque limit ④Decrease load inertia ⑤Change to driver and motor with bigger power
			Too high power of main circuit	Check main power source
			Wrong parameter setting	Set correct relevant parameters

Alarm code	Alarm name	Running status	Cause	Treatment
			Running for a long time by over the rated torque	①Check load and reduce start-stop frequency ②reduce torque limit ③Change to driver and motor with bigger power
15	Non-abnormal brake fault		brake circuit is abnormal to give no brake signal and cause abnormal driver alarm	Change driver
			Disturbed	① Add circuit filter ② away from disturbance source
24	Current sampling circuit in fault		Chip or circuit board damaged	Change servo driver

Table 9-2 Alarm Treatment

Warranty Agreement

The warranty period of the product is 12 months (subject to the production date on the frame). Within this period, if any fault or damage occurs under normal operation condition according to the user manual, our company will repair it for free.

During warranty period, certain maintenance charge will be collected for damage caused by the following reasons:

A. Machine damage caused by incorrect operation, self-repair without permission or transformation;
B. Machines damage caused by fire, flood, abnormal voltage, other natural disasters or secondary disasters;
C. Hardware damage caused by artificial dropping and transport after purchase;
D. Machine damage caused by operation not in accordance with the user manual our company provided;
E. Fault and damage caused by obstacles beyond the machine (e.g., external equipment factor);

Maintenance charge is collected according to the latest Maintenance Price List. Before maintenance, maintenance personnel of our company will contact with you on phone to provide quotation, and only with consent on the quotation the maintenance will be carried out. If any question in the service process, please contact with our agent or our company in time.

Shenzhen Easydrive Electric Co., Ltd. reserves all the right for final explanation of the agreement.

EVTA Servo Business Division

Shenzhen Easydrive Electric Co., Ltd.

Address: Building 11, Jingxuan Industrial Park, Donghuan 2 Road, Longhua, Baoan District, Shenzhen

Post code: 518109

Product technology service hotline: 400-700-2586 http://www.szeasyDriver.com